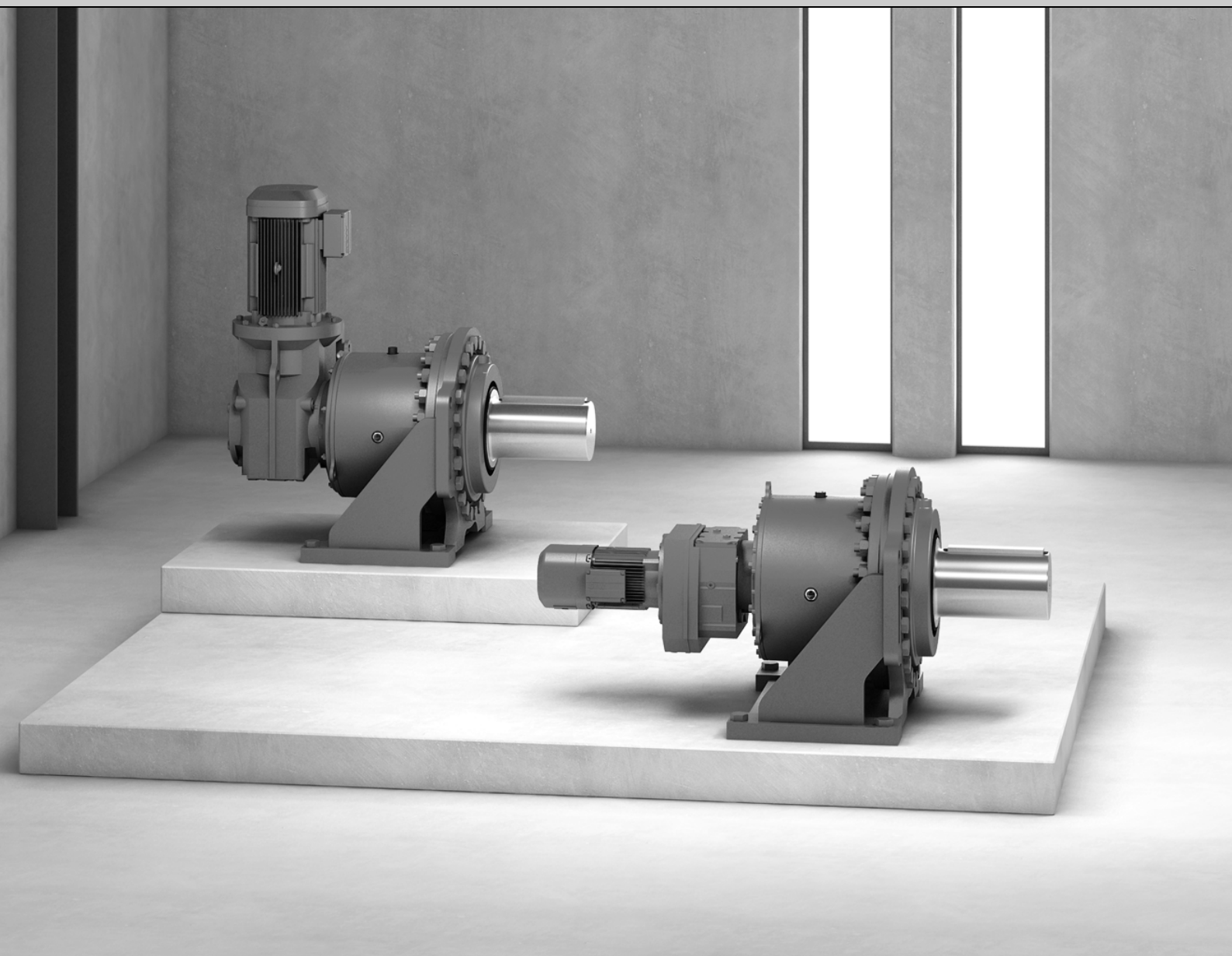




**SEW**  
**EURODRIVE**

# Assembly and Operating Instructions



Industrial Gear Units  
**Planetary Gearmotors**  
**P002 – P082 Series**  
Torque Ratings 24 – 359 kNm





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# 1 Important Notes

## 1.1 How to use the operating instructions

The operating instructions are an integral part of the product and contain important information for operation and service. The operating instructions are written for all employees who assemble, install, startup, and service this product.

The operating instructions must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. Consult SEW-EURODRIVE if you have any questions or if you require further information.

## 1.2 Structure of the safety notes

### 1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes, notes on potential risks of damage to property, and other notes.

Signal word	Meaning	Consequences if disregarded
<b>⚠ DANGER</b>	Imminent danger	Severe or fatal injuries
<b>⚠ WARNING</b>	Possible dangerous situation	Severe or fatal injuries
<b>⚠ CAUTION</b>	Possible dangerous situation	Minor injuries
<b>NOTICE</b>	Possible damage to property	Damage to the drive system or its environment
<b>INFORMATION</b>	Useful information or tip: Simplifies the handling of the drive system.	

### 1.2.2 Structure of the section-related safety notes

Section safety notes do not apply to a specific action, but to several actions pertaining to one subject. The used symbols indicate either a general or a specific hazard.

This is the formal structure of a section safety note:



#### **⚠ SIGNAL WORD**

Type and source of danger.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the danger.

### 1.2.3 Structure of the embedded safety notes

Embedded safety notes are directly integrated in the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- **⚠ SIGNAL WORD** Nature and source of hazard.  
Possible consequence(s) if disregarded.  
– Measure(s) to prevent the danger.



### **1.3    *Rights to claim under warranty***

You must comply with the information contained in these operating instructions to ensure safe operation of the gear units and to achieve the specified product characteristics and performance features. SEW-EURODRIVE does not assume liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

### **1.4    *Exclusion of liability***

You must comply with the information contained in these operating instructions to ensure safe operation of the P002 – P082 series planetary gear units and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE does not assume liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

### **1.5    *Copyright***

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Unauthorized duplication, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.



## 2 Safety Notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and adhered to. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURO-DRIVE.

### 2.1 Preliminary remark

The following safety notes are primarily concerned with the use of gear units. If using gearmotors, also refer to the safety notes for motors in the corresponding operating instructions.

Also observe the supplementary safety notes in the individual sections of these operating instructions.

### 2.2 General



#### **⚠ WARNING**

During operation, the gear units can have movable or rotating parts as well as hot surfaces.

Severe or fatal injuries

- All work related to transportation, storage, setup/mounting, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observance of:
  - The relevant detailed operating instructions
  - Warning and safety signs on the gear unit
  - All other project planning documents, operating instructions and wiring diagrams related to the drive
  - The specific regulations and requirements for the system
  - The national/regional regulations governing safety and the prevention of accidents
- Never install damaged products
- Immediately report any damage to the shipping company
- Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property.

Refer to the documentation for additional information.



### **2.3 Designated use**

P002 – P082 series planetary gear units are gear units driven by motors for industrial and commercial systems. The units may only be run at the speeds and powers shown in the technical data or on the nameplate. Implementing gear unit loads other than the permitted values or operating the gear units in areas of application other than industrial and commercial systems is only permitted after consultation with SEW-EURODRIVE.

Using these products in potentially explosive atmospheres is prohibited, unless specifically designated otherwise.

In compliance with the EC Machinery Directive 2006/42/EC, the planetary gear units are components for installation in machinery and systems. In the scope of the EC directive, you must not take the machinery into operation in the proper fashion until you have established that the end product complies with Machinery Directive 2006/42/EC.

### **2.4 Other applicable documentation**

The following publications and documents have to be observed as well:

- When using gearmotors, also observe the safety notes for motors and primary gear units in the accompanying operating instructions.
- Operating instructions of any attached options

### **2.5 Target group**

Any mechanical work may only be performed by adequately qualified personnel. Qualified personnel in this context are persons who are familiar with the setup, mechanical installation, trouble shooting and maintenance for this product. Further, they are qualified as follows:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- They are familiar with these operating instructions.

Any electronic work may only be performed by adequately qualified electricians. Qualified electricians in this context are persons who are familiar with the electronic installation, startup, trouble shooting and maintenance for this product. Further, they are qualified as follows:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- They are familiar with these operating instructions.

All work in further areas of transportation, storage, operation and waste disposal must only be carried out by persons who are trained appropriately.

All qualified personnel must wear appropriate protective clothing.



## 2.6 Safety symbols on the gear unit







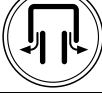
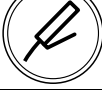

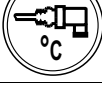

### **⚠ CAUTION**

Safety symbols or signs can become dirty or illegible over time.

Risk of injury due to illegible symbols.

- Always make sure that safety, warning, and operating notes are legible.
- Replace damaged safety symbols and signs.

The safety symbols on the gear unit must be observed. They have the following meaning:

Safety symbols	Meaning
	Oil fill plug
	Oil drain
	Oil dipstick
	Oil sight glass
	Breather plug
	Regreasing point
	Air outlet screw
	Temperature sensor
	Direction of rotation

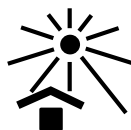


## 2.7 Symbols on the packaging

The symbols on the packaging must be observed. They have the following meaning:



Fragile



Protect  
from heat



Fasten  
here



Hand hooks  
prohibited



Up



Keep dry



Center of gravity

1811486091



## 2.8 Transport

### 2.8.1 Notes on transport



#### **⚠ WARNING**

Suspended loads can fall.

Severe or fatal injuries.

- Do not stand under the suspended load.
- Secure the danger zone.



#### **⚠ CAUTION**

Risk of slipping due to lubricant leaking from damaged seals.

Minor injuries

- Check the gear unit and mount-on components for leaking lubricant.



#### **NOTICE**

Improper transport may result in damage to the gear unit.

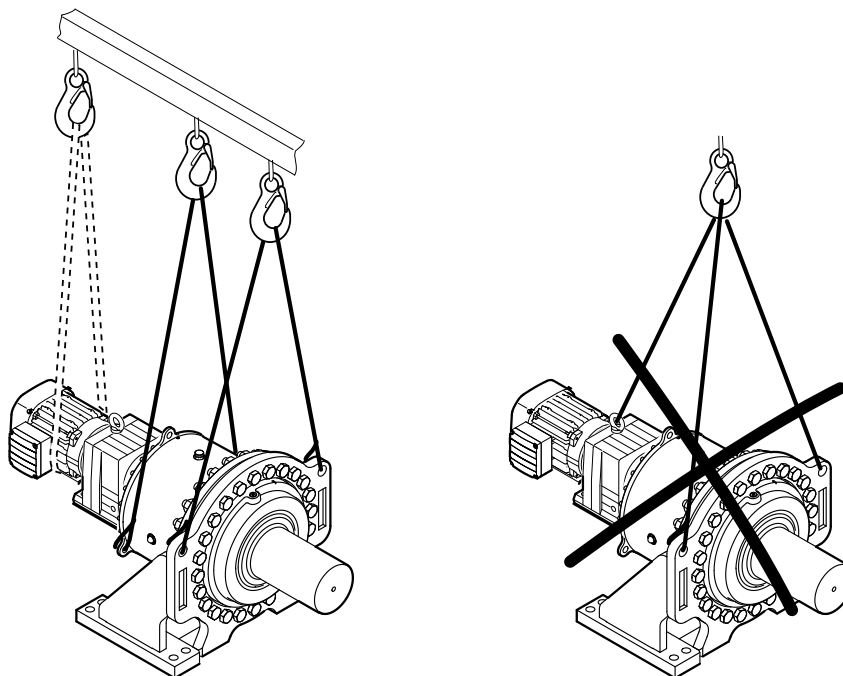
Possible damage to property.

- Note the following:
- Inspect the shipment for any damage that may have occurred in transit as soon as you receive the delivery. Inform the shipping company immediately. It may be necessary to preclude startup.
- The weight of the gear unit is indicated on the nameplate or the dimension sheet. Observe the loads and specifications given on the nameplate.
- Pay attention to the center of gravity of the gear unit.
- Use suitable, sufficiently rated and undamaged handling equipment.
- Transport the gear unit without oil fill.
- Transport the gear unit in such a way that the lifting gear is tensioned vertically only.
- The gear unit must be transported in a manner that prevents damage to the gear unit. For example, impacts against exposed shaft ends can damage the gear unit.
- Planetary gear units and planetary gearmotors are suspended from the transport points marked in the drawings below. Transport straps (indicated with broken lines in the following figures) help balancing and supporting the planetary gear unit.

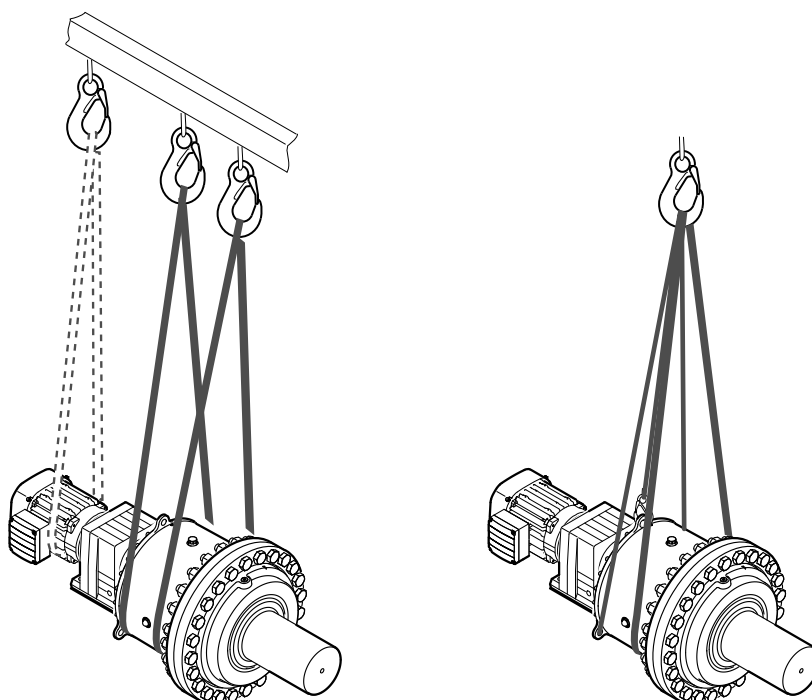
The following figures illustrate how to transport the gear unit.

**2.8.2 Foot-mounted planetary gear unit**

The following figure shows an example of how to transport a foot-mounted planetary gear unit.

**2.8.3 Flange-mounted planetary gear unit**

The following figure shows an example of how to transport a flange-mounted planetary gear unit.







## **2.9 Storage and transport conditions**

The gear units can be provided with the following protection and packaging types depending on the storage and transport conditions.

### **2.9.1 Internal corrosion protection**

#### *Standard corrosion protection*

After the test run, the test oil fill is drained out of the gear unit. The remaining oil film protects the gear unit against corrosion for a limited period of time.

#### *Long-term corrosion protection:*

After the test run, the test oil fill is drained out of the gear unit and the interior space is filled with a vapor phase inhibitor. The breather filter is replaced by a screw plug and enclosed with the gear unit.

### **2.9.2 Exterior corrosion protection**

The following measures are generally taken for exterior corrosion protection:

- Corrosion protection is applied to bare, non-painted functional surfaces of shafts, flanges, mounting and foot surfaces on the gear unit. Remove it only using an appropriate solvent which is not harmful to the oil seal.
- Small spare parts and loose pieces, such as bolts, nuts, etc., are packed in corrosion protection plastic bags (VCI corrosion protection bags).
- Threaded holes and blind holes are covered by plastic plugs.
- If the gear unit elevator drive is stored longer than six months, you must check the protective coating of unpainted areas as well as the paint coating regularly. Areas with protective coating and/or paint that has been removed may have to be repainted.

### **2.9.3 Packaging**

#### *Standard packaging*

The gear unit is delivered on a pallet without cover.

Application: Land transport

#### *Long-term packaging*

The gear unit is delivered in a wooden box that is also appropriate for sea transport.

Application: Sea transport and/or for long-term storage



## Safety Notes

### Storage and transport conditions

#### 2.9.4 Storage conditions



#### NOTICE

Improper storage may result in damages to the gear unit.

Possible damage to property.

- During storage up to startup, the gear unit must be stored in a shock-free manner in order to prevent damage to the rolling bearing races.
- The output shaft must be rotated at least one full rotation every six months so that the position of the roller elements in the bearings of the input and output shafts changes.



#### INFORMATION

The gear units are delivered without oil; different protection systems are required depending on the storage period and storage conditions as shown in the table below.

Corrosion protection + packaging	Storage location	Storage duration
Standard corrosion protection + Standard packaging	Under roof, enclosed at constant temperature and atmospheric humidity (5 °C < $\vartheta$ < 60 °C, relative humidity < 50%). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). Protected against aggressive vapors and shocks.	Max. 6 months with intact surface corrosion protection
Long-term corrosion protection: + Standard packaging	Under roof, enclosed at constant temperature and atmospheric humidity (5 °C < $\vartheta$ < 60 °C, relative humidity < 50%). No sudden temperature fluctuations. Controlled ventilation with filter (free from dust and dirt). Protected against aggressive vapors and shocks.	Max. 3 years with regular inspection and checking for intactness.
Long-term corrosion protection: + Long-term packaging	With roof, protected against rain and shocks.	Max. 3 years with regular inspection and checking for intactness.



#### INFORMATION

If stored in tropical zones, provide for sufficient protection against insect damage. Contact SEW-EURODRIVE for differing requirements.



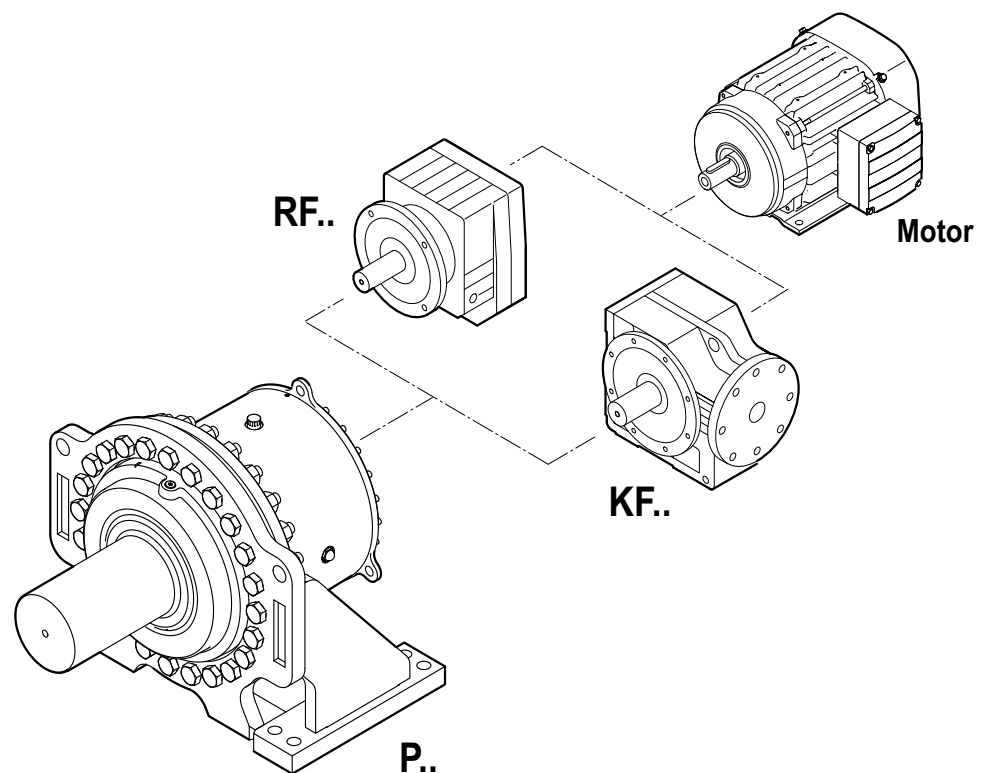
### **3 Gear Unit Design**

#### **3.1 Combination of planetary gear unit with primary gear unit**

The planetary gear units are a combination of

- P.. planetary gear unit Output stage
- Primary gear unit RF.. or KF..
- Mount-on components: Motor, coupling, adapter and backstop

The following figure shows a sample combination of a planetary gear unit, a primary gear unit and a motor.



1044069259

- P..** Planetary gear unit  
**RF..** Helical gear unit (flange-mounted)  
**KF..** Helical-bevel gear unit (flange-mounted)



### 3.2 Nameplate and unit designation

#### 3.2.1 Planetary gear unit

The following example shows the layout of the nameplate.

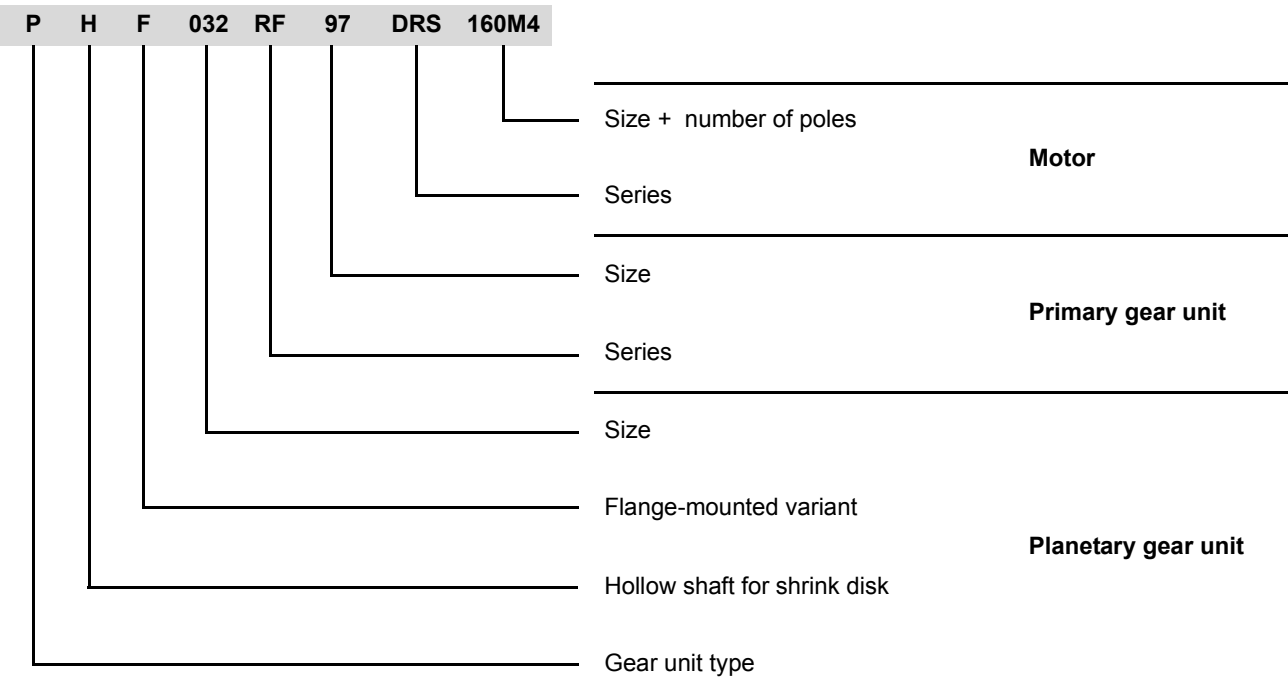
○ SEW-EURODRIVE		Bruchsal / Germany		○	
Type	PF042 KF97 DRS132 ML4 / TF				
Nr. 1	01.1101687801.0001.10 / 12345678				
	norm.	min.	max.	i	1 : 1880
PK1 [kW]	6.6	1.3	6.6	FS	1.3
MK2 [Nm]	77000	77000	77000	FR1 [N]	0
n1 [1/min]	1430	285	1430	FR2 [N]	0
n2 [1/min]	0.77	0.15	0.77	FA1 [N]	0
Operation instruction have to be observed!				FA2 [N]	50000
Made in Germany				Mass [kg]	840
Qty of greasing points		0	Fans	0	
		CLP HC VG220 synth. Oil - 29 ltr.			Year
○					○

3319008779

Type		Type designation
No. 1		Serial number
P <sub>K1</sub>	[kW]	Operating power on the input shaft (HSS)
M <sub>K2</sub>	[Nm]	Gear unit output torque
n <sub>1</sub>	[rpm]	Input speed (HSS)
n <sub>2</sub>	[rpm]	Output speed (LSS)
norm.		Standard operating point
min.		Operating point at minimum speed
max.		Operating point at maximum speed
i		Exact gear unit reduction ratio
F <sub>S</sub>		Service factor
F <sub>R1</sub>	[N]	Actual overhung load acting on the input shaft
F <sub>R2</sub>	[N]	Actual overhung load acting on the output shaft
F <sub>A1</sub>	[N]	Actual axial load acting on the input shaft
F <sub>A2</sub>	[N]	Actual axial load acting on the output shaft
Mass	[kg]	Weight of the gear unit
Number of greasing points		Number of regreasing points
Fans		Number of installed fans
		Oil grade and viscosity class/oil quantity
Year		Year of manufacture
IM		Mounting position and mounting surface



The gear unit designation is structured as follows:



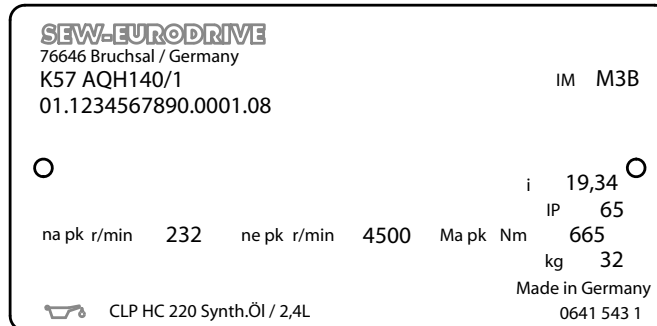


## Gear Unit Design

### Nameplate and unit designation

#### 3.2.2 Primary gear unit

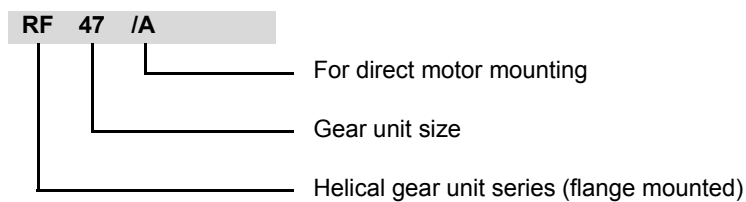
The following example shows the layout of the nameplate.



210927627

$f_b$		= Service factor
$F_{Ra \max}$	[N]	= Maximum overhung load on the output side
$F_{Re \max}$	[N]	= Maximum overhung load on the input side (with input shaft assembly AD)
$i$		= Gear unit reduction ratio
<b>IM</b>		= Mounting position
<b>IP..</b>		= Degree of protection
$n_{e \max}$	[rpm]	= maximum input speed
$n_a$	[rpm]	= Output speed
$M_{e \max}$	[Nm]	= maximum input torque
$M_a$	[Nm]	= Output torque
$M_R$	[Nm]	= Overload torque when using an AR adapter
$M_{RS}$	[Nm]	= Locking torque of the backstop

The gear unit designation is structured as follows:



#### INFORMATION

For a detailed overview of unit designations and additional information, refer to the following publications:

- "Gear Units" catalog or
- "Gearmotors" catalog



### 3.2.3 Primary gear unit with motor

The following example shows the layout of the nameplate.

**SEW-EURODRIVE** Bruchsal / Germany

Typ **KF97 DRS160M4**

Nr. **01.3998708401.0001.01** 3~IEC60034

1/min **1460/26**      kW **11 S1**      i **56.55**      Nm **4070**

○ V **400/690 Δ/Y**      cos φ **0.81**      eff% **90.7**      ○

V **380-420 Δ/660-725 Y**      A **22.5/13.0**      Iso.Kl. **130 (B)**

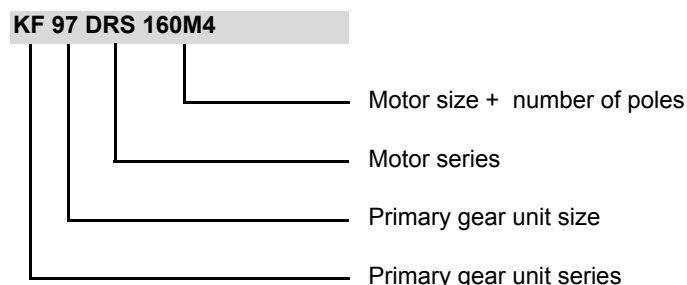
IM **M1**      IP **54**      Hz **50.0**

**CLP 220 Miner.Öl / 7.0 l**      kg **251.000**

1419791115

Type		Type designation
No.		Serial number of primary gearmotor
i		Gear ratio
rpm	[rpm]	Input/output speed
Nm	[Nm]	Output torque
kW	[kW]	Input power of the gear unit
S1		Operating mode
cos φ		Power factor of the motor
V	[V]	Supply voltage in delta/star connection
A	[A]	Rated motor current in delta/star connection
Hz	[Hz]	Line frequency
IM		Mounting position
kg	[kg]	Weight of the primary gearmotor
IP		Degree of protection of the motor
Brake V	[V]	Brake connection voltage
Nm	[Nm]	Braking torque
		Oil grade and viscosity class/oil quantity

The motor designation is structured as follows:



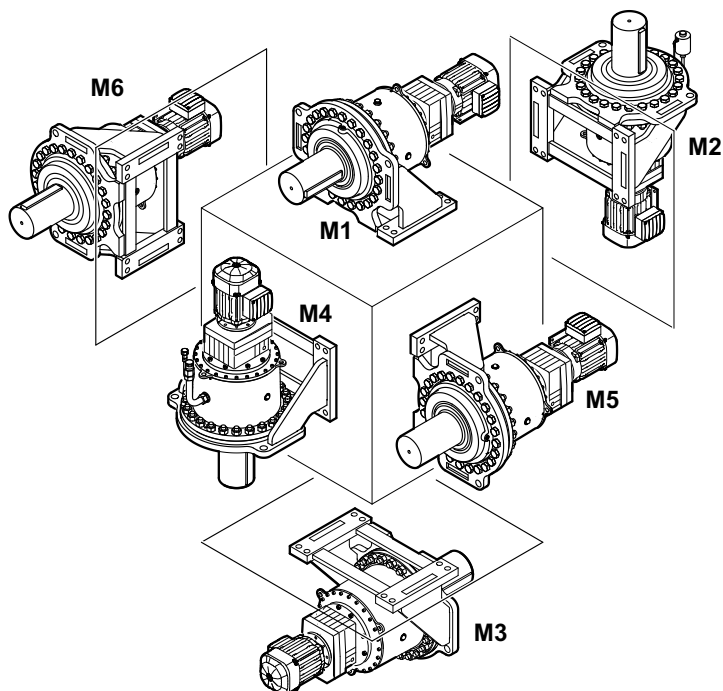


### 3.3 Mounting position

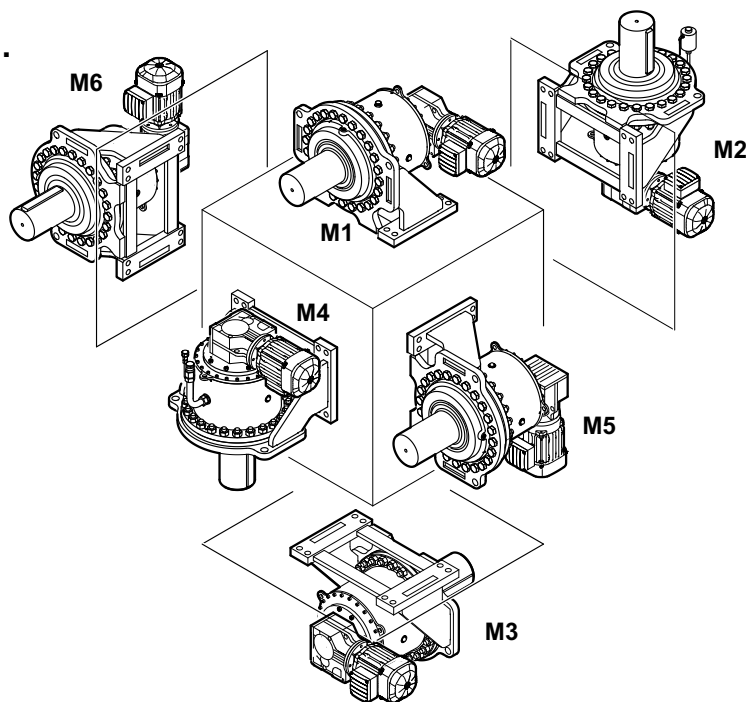
The mounting position defines the spatial orientation of the gear unit housing and is designated **M1..M6**.

The mounting positions apply to planetary gear units with solid shafts and hollow shafts.

#### P..RF..



#### P..KF..




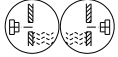




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### 3.4 Mounting position sheets

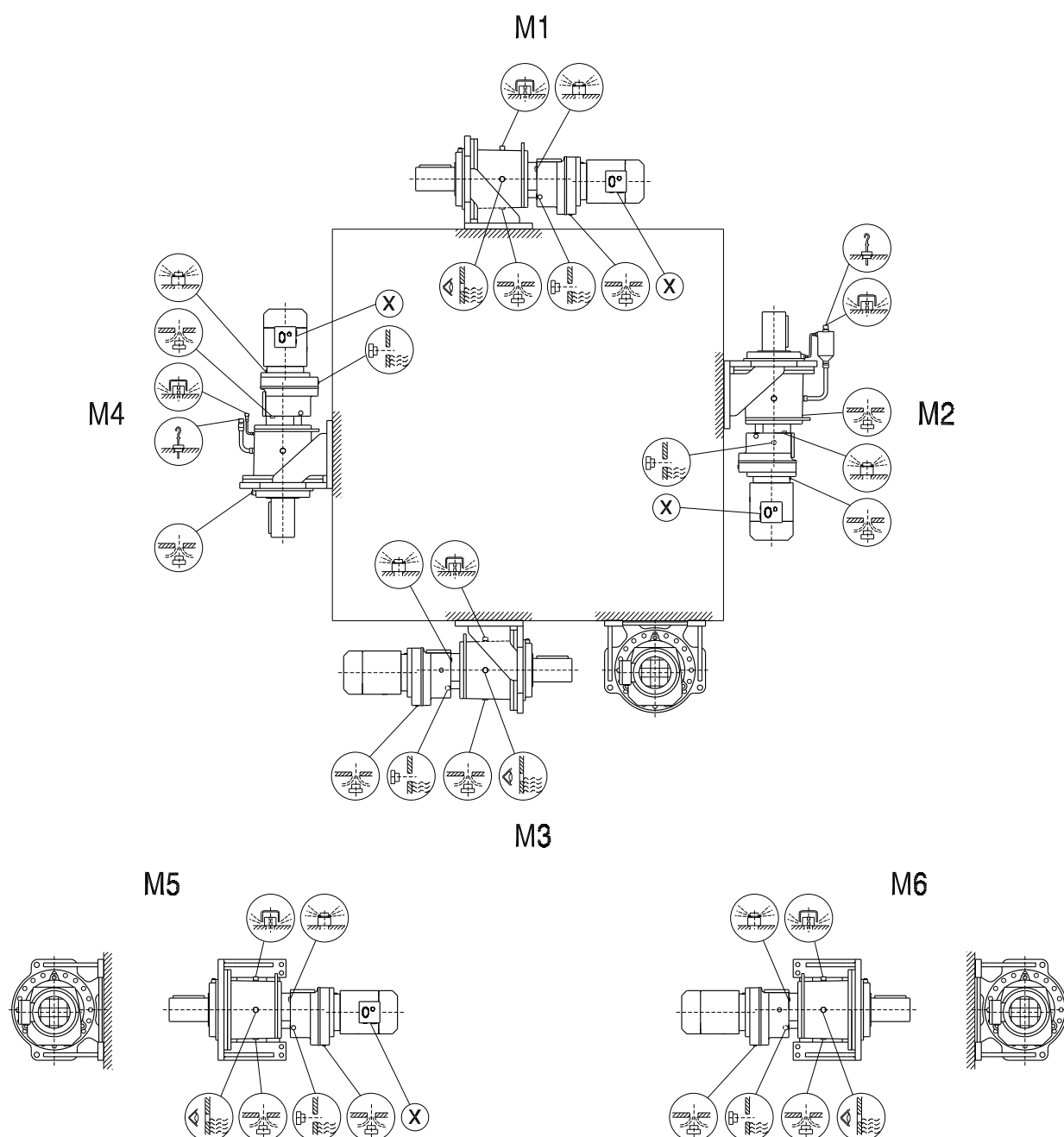
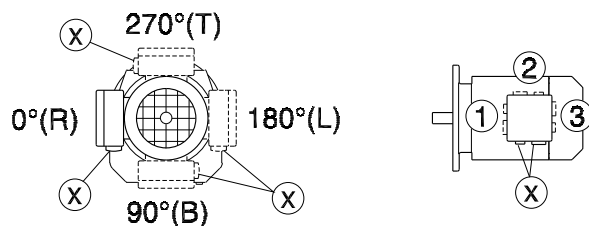
The following table shows the symbols used in the mounting position sheets and their meaning:

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug
	Breather
	Oil dipstick
	Oil sight glass



### 3.4.1 P..RF..

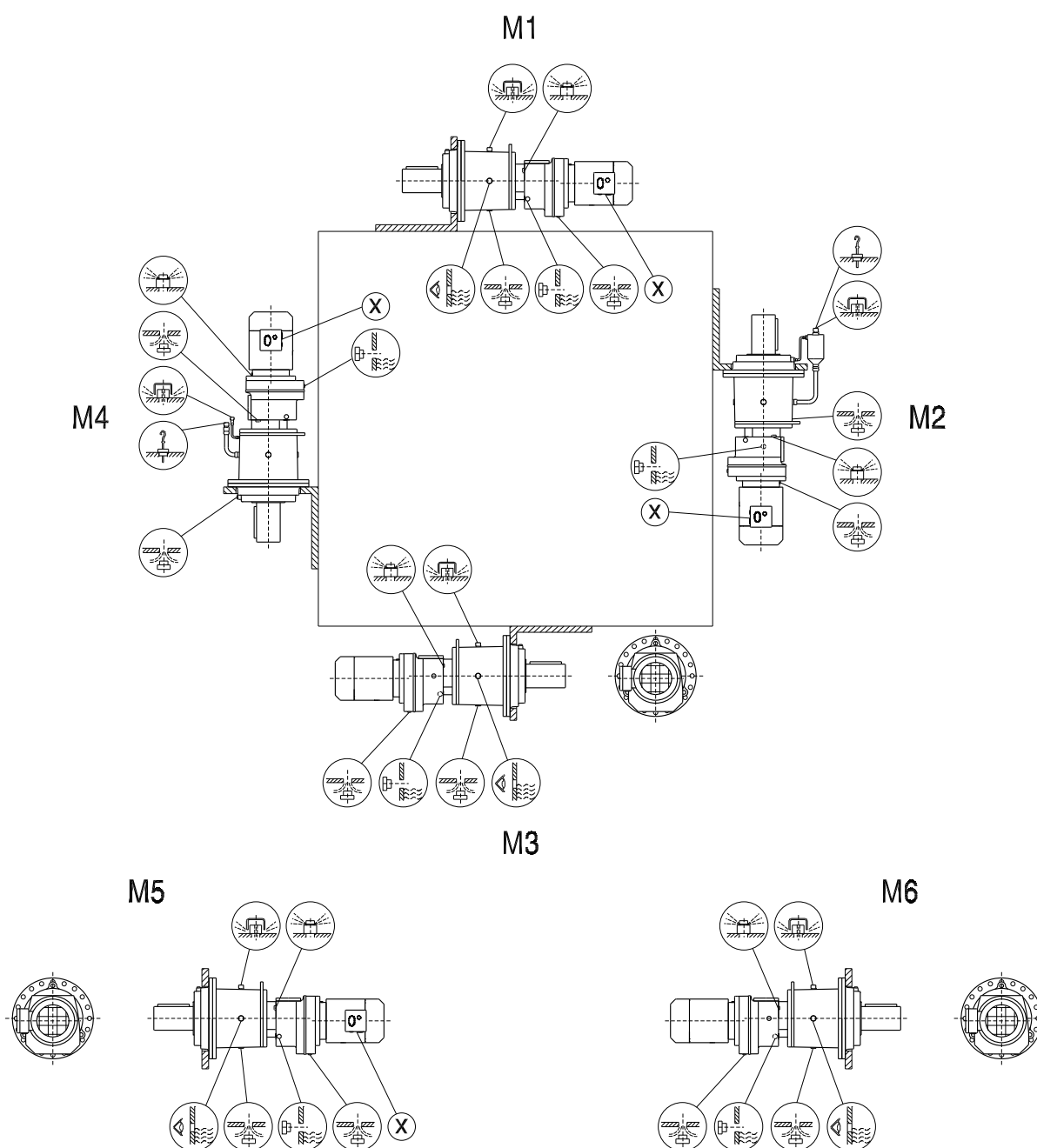
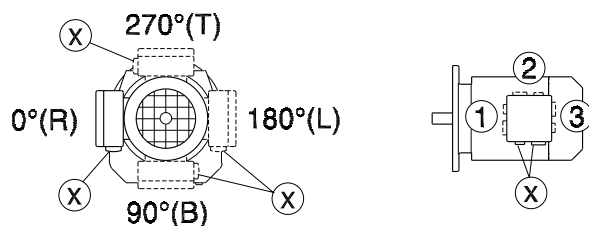
45 129 00 08





**3.4.2 PF..RF..**

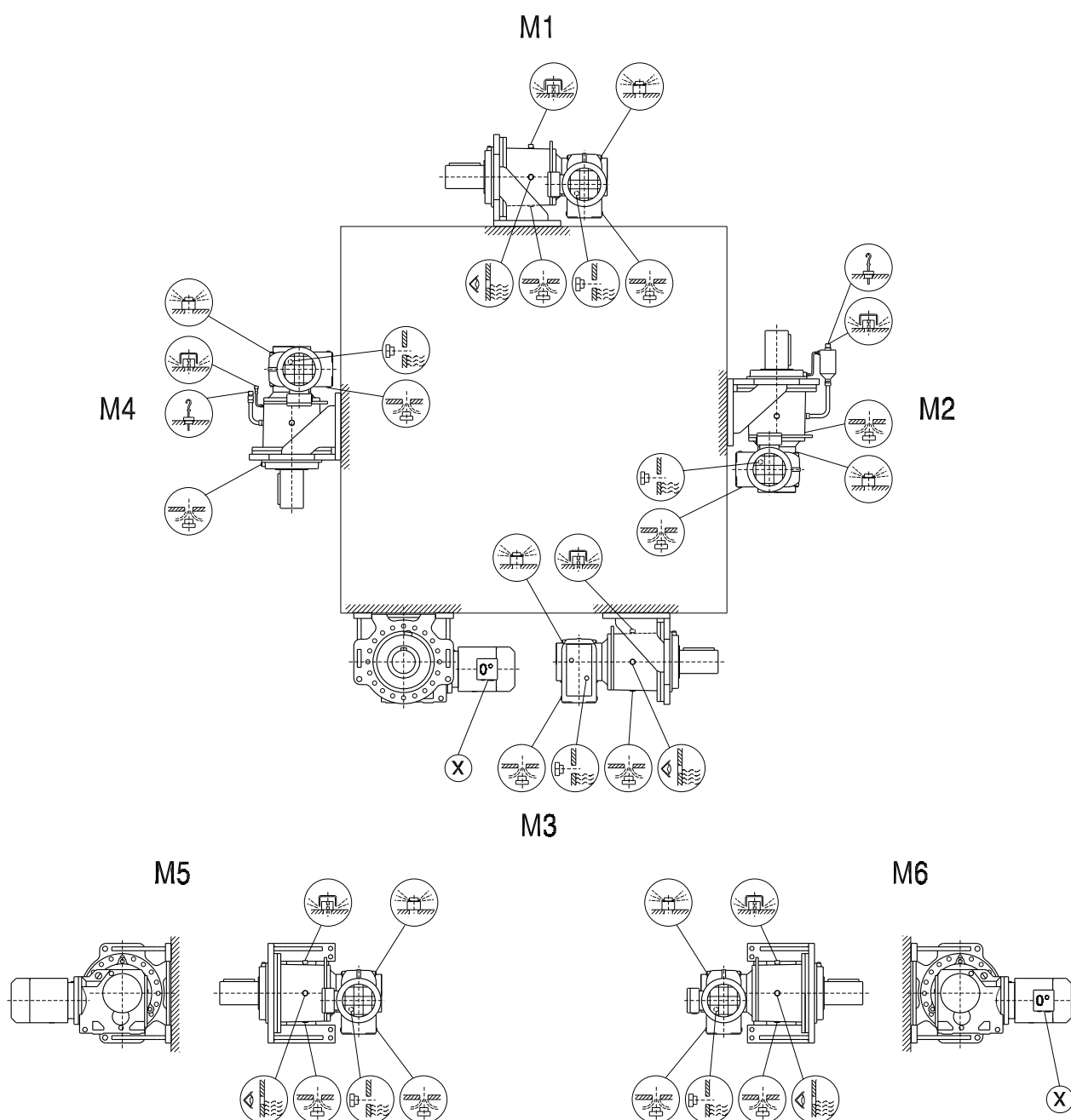
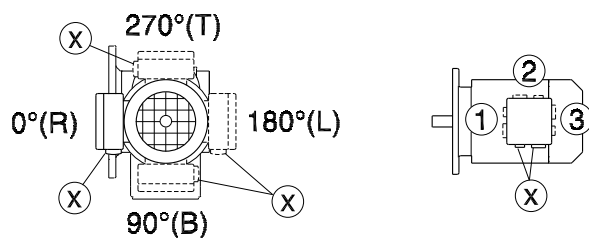
**45 130 00 08**





### 3.4.3 P..KF..

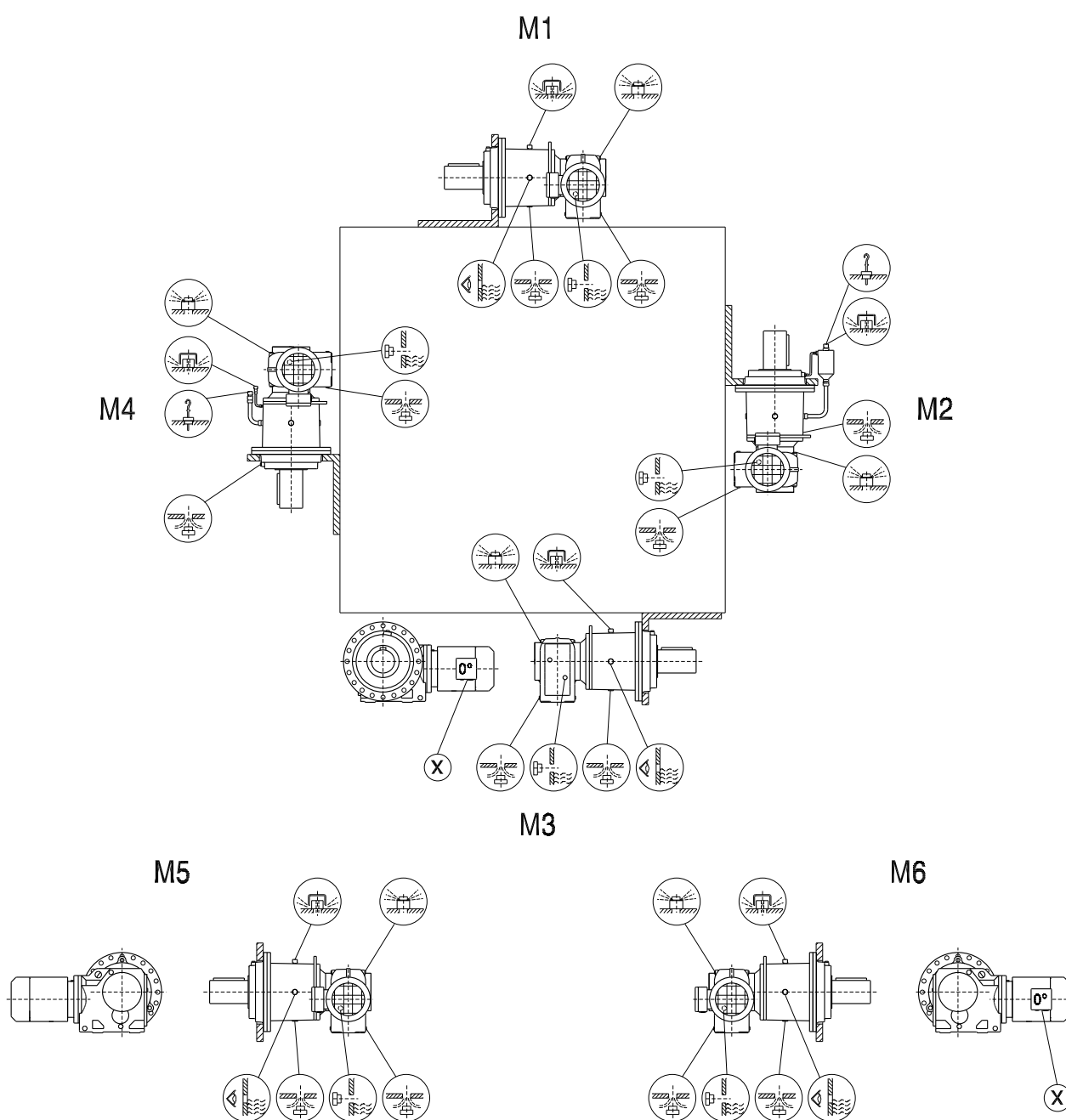
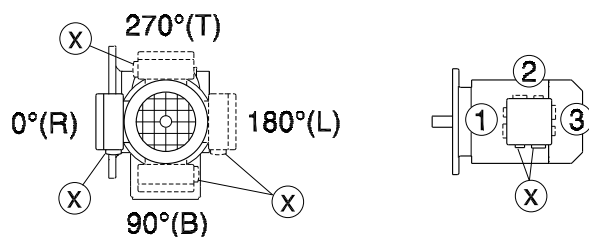
45 131 00 08





**3.4.4 PF.KF..**

**45 132 00 08**





## Gear Unit Design

### Mounting positions of the primary gear units

#### 3.5 Mounting positions of the primary gear units



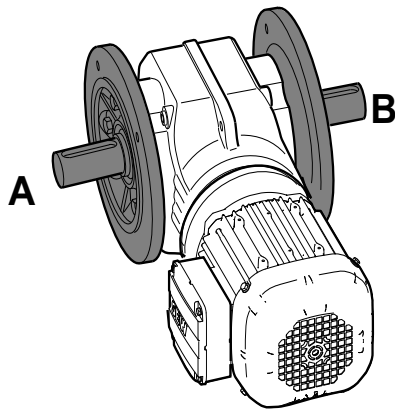
##### INFORMATION

In addition to the mounting position, the following information is specified for the planetary gear motors.

##### 3.5.1 KF.. primary bevel gear unit

For the primary bevel gear units KF.., positions **0°**, **90°**, **180°** or **270°** are fixed.

The position of the mounting flange on the **A** or **B** side is also defined.



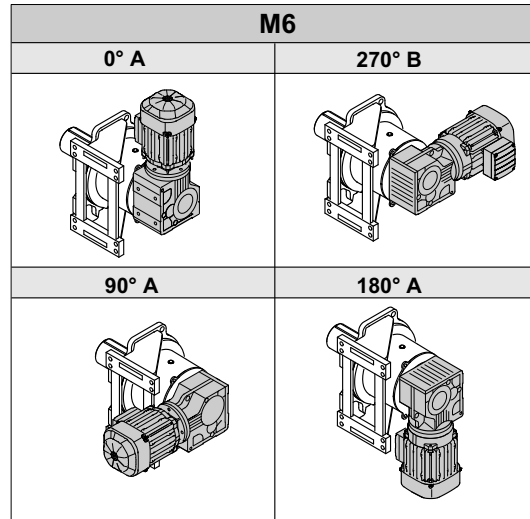
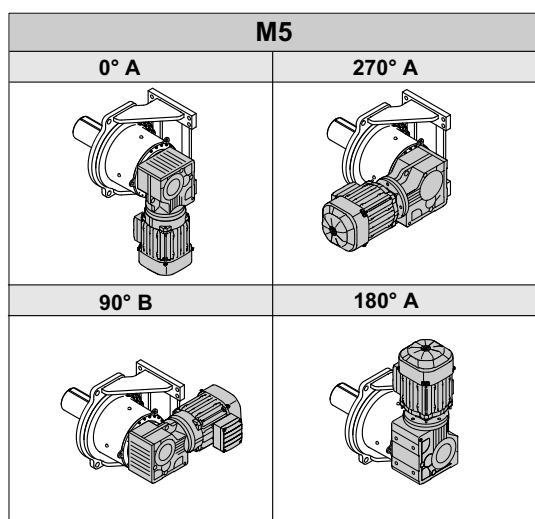
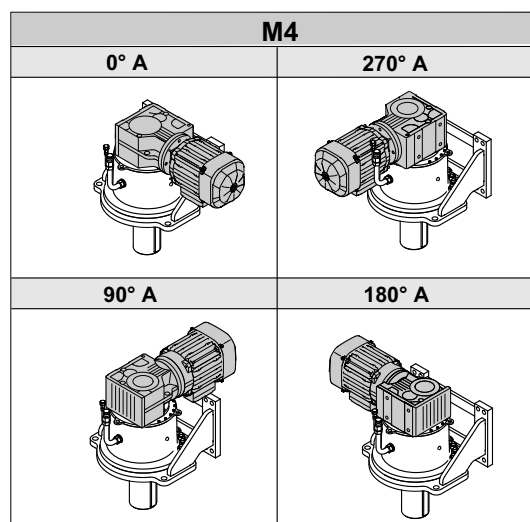
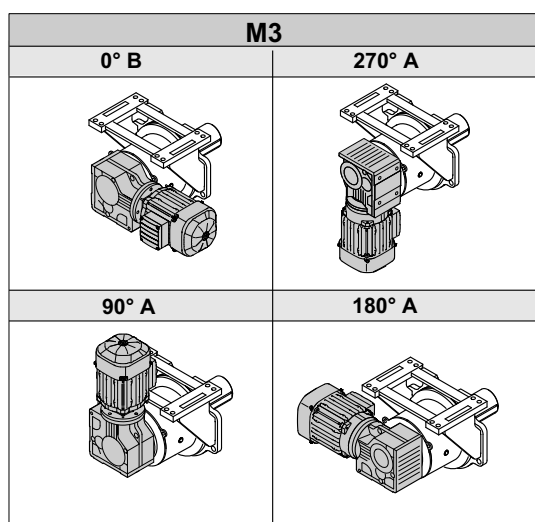
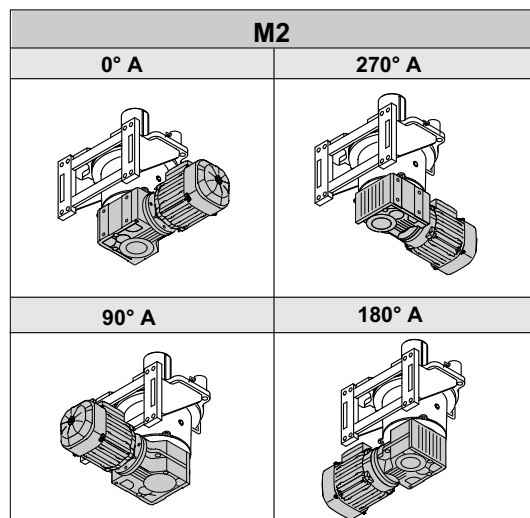
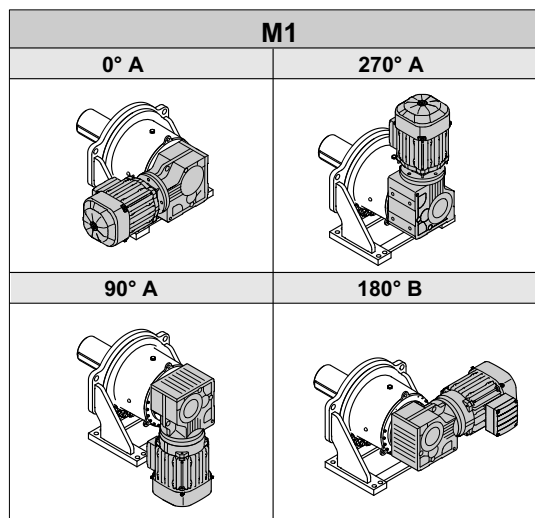
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To reduce the churning losses in the primary gear unit to a minimum, SEW-EURO-DRIVE recommends to choose from the standard mounting positions displayed below.



##### INFORMATION

Contact SEW-EURODRIVE in case of deviating mounting conditions.



1043699211

Key	
M1 / M2 / M3 / M4 / M5 / M6	= Mounting position of planetary gear unit
0° / 90° / 180° / 270°	= Mounting position of primary bevel gear unit
A / B	= Position of the mounting flange at the primary bevel gear unit



## Gear Unit Design

### Mounting positions of the primary gear units

#### 3.5.2 RF.. primary helical gear unit

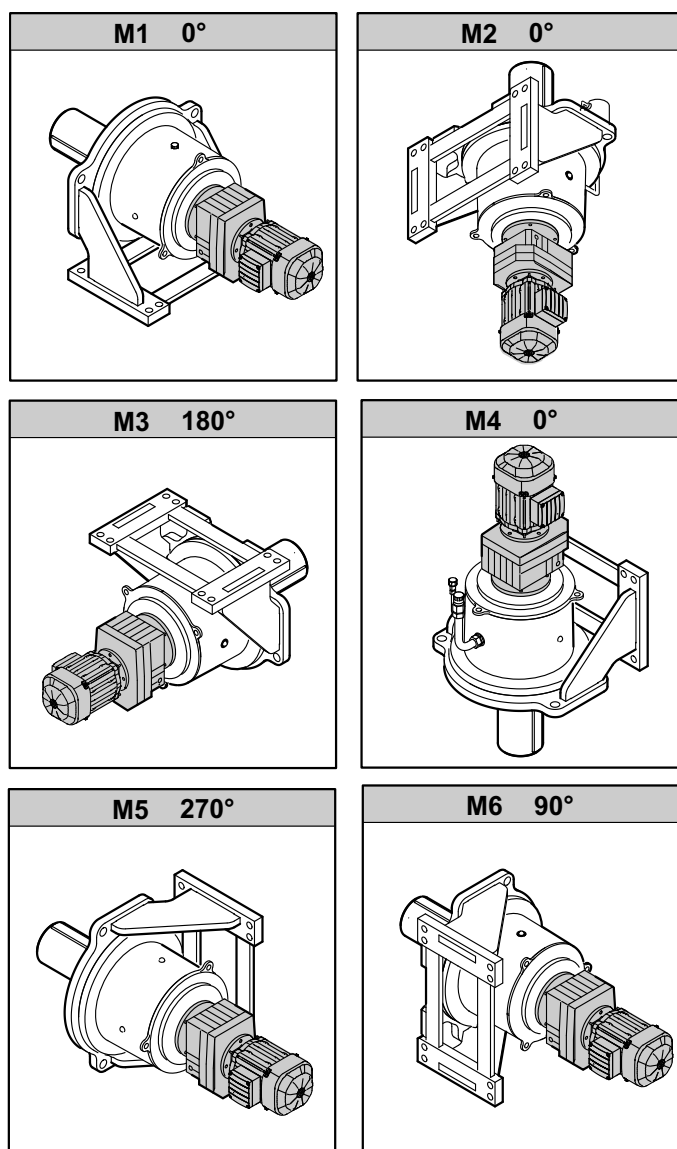
For the primary helical gear units RF.., positions **0°**, **90°**, **180°** or **270°** are fixed.

To reduce the churning losses in the primary gear unit to a minimum, SEW-EURODRIVE recommends to choose from the standard mounting positions displayed below.



#### INFORMATION

Contact SEW-EURODRIVE in case of deviating mounting conditions.



1043719691

Key	
<b>M1 / M2 / M3 / M4 / M5 / M6</b>	= Mounting position of planetary gear unit
<b>0° / 90° / 180° / 270°</b>	= Mounting position of primary helical gear unit





### 3.6 Pivoted mounting position and variable mounting positions

Mounting positions other than standard mounting positions are referred to as pivoted or variable mounting positions.

Gear units with pivoted mounting position have a **fixed** mounting position that differs from the standard.

Gear units with variable mounting position can change the mounting position **variably** within the specified range.

The designation of pivoted and variable mounting positions is set up as follows:

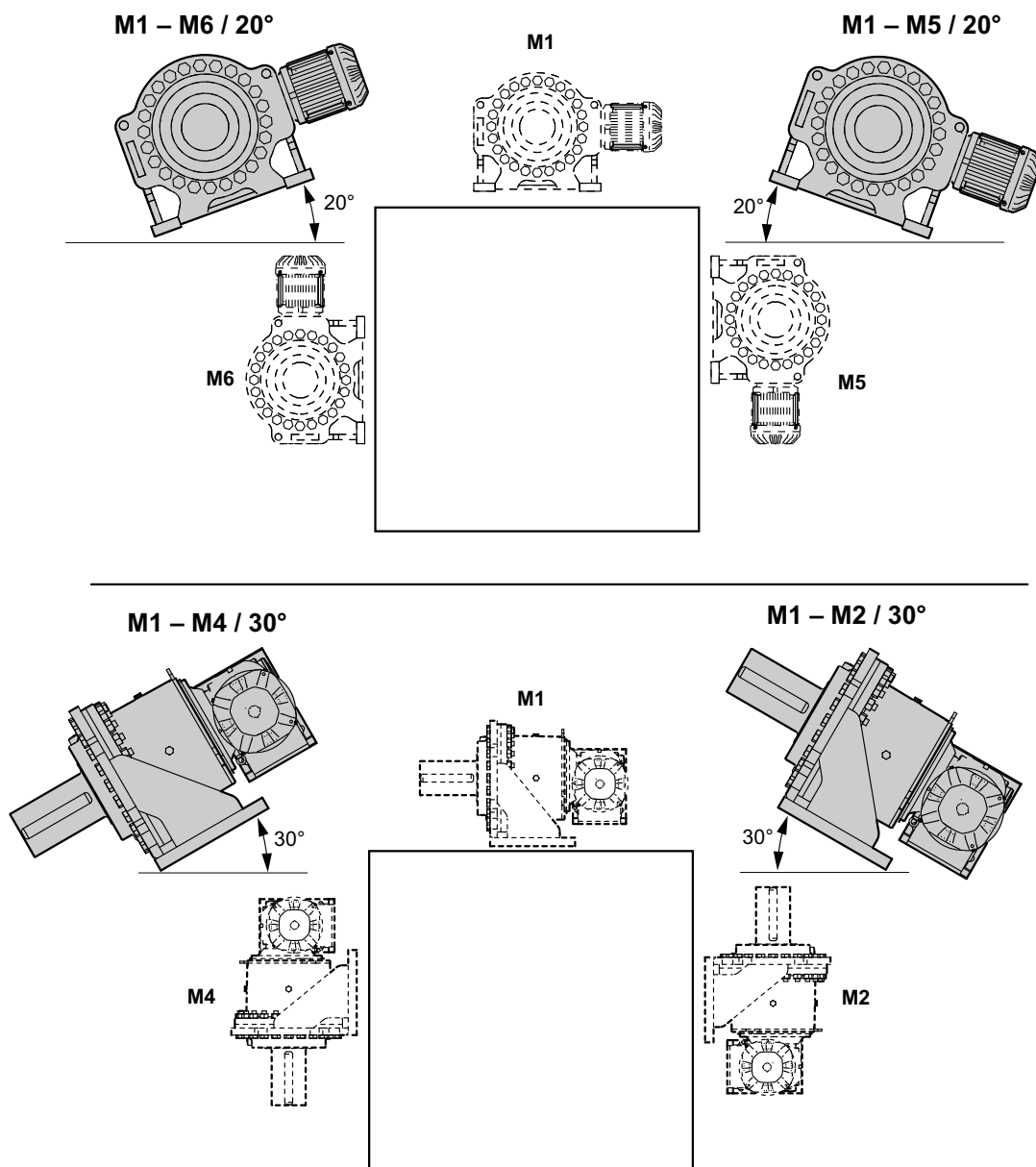
**M1 - M2/20°/V**

[1] [2] [3] [4]

[1] Initial mounting position [3] Pivoting angle

[2] Desired mounting position [4] F = Fixed final position; V = Variable final position

The following figure shows some examples:



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## Gear Unit Design

### Pivoted mounting position and variable mounting positions

---

All final positions have to be specified if the mounting position of the gear unit deviates from standard mounting positions in several directions. Combinations of fixed and variable final positions are possible.

Example of a gear unit based on M1 that is tilted by  $\pm 20^\circ$  around the drive shaft during operation and is mounted in a fixed angle of  $30^\circ$  around the longitudinal axis:

**M1 - M2/20°/V - M4/20°/V - M5/30°/F**



#### INFORMATION

Pivoted and variable mounting positions may involve restrictions concerning accessories and technical data. Also, delivery times might be longer. Consult SEW-EURODRIVE.

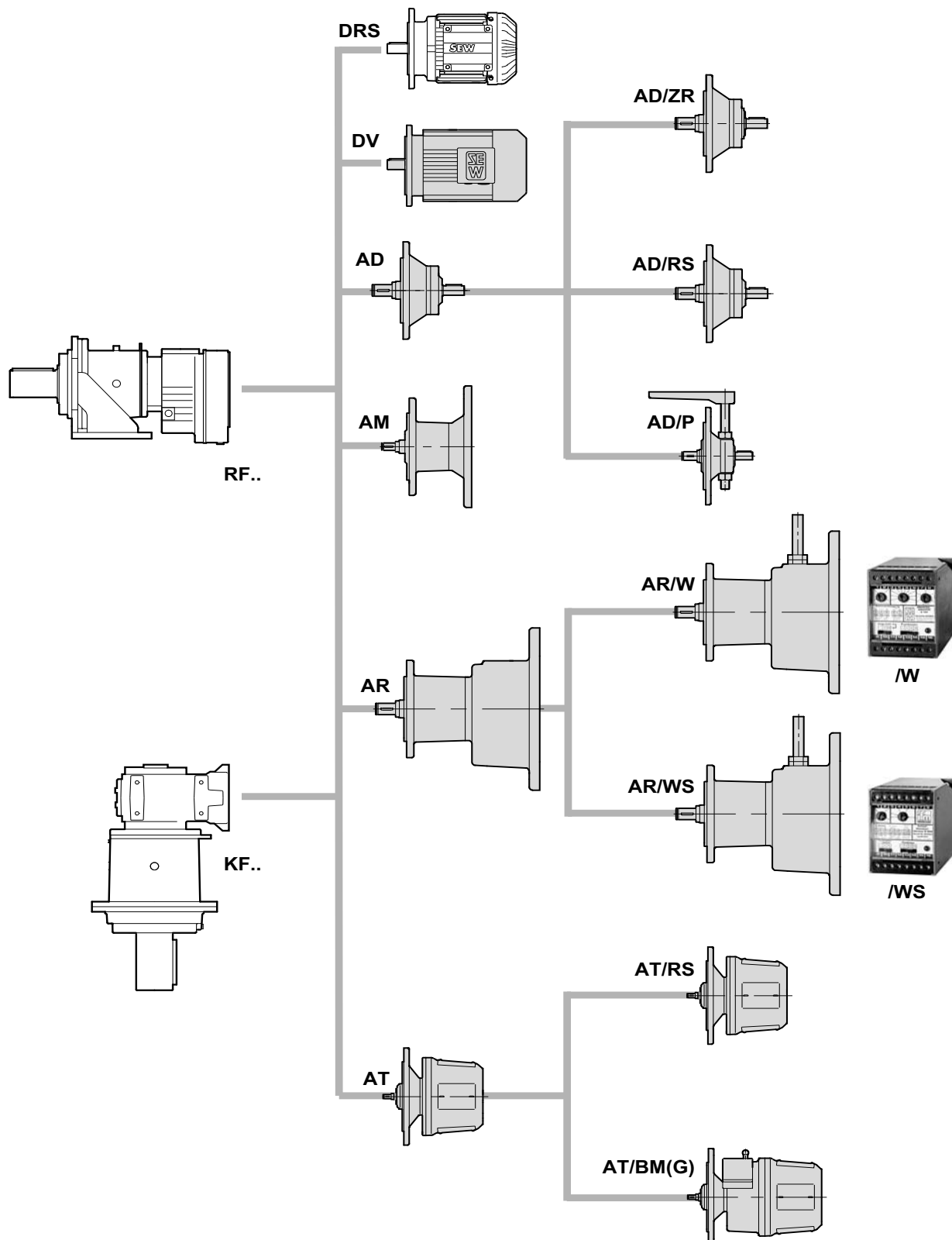
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## 4 Structure of Options and Additional Features

### 4.1 Input components

The following figure shows an overview of the components on the the input side.





## **4.2 Torque arm**

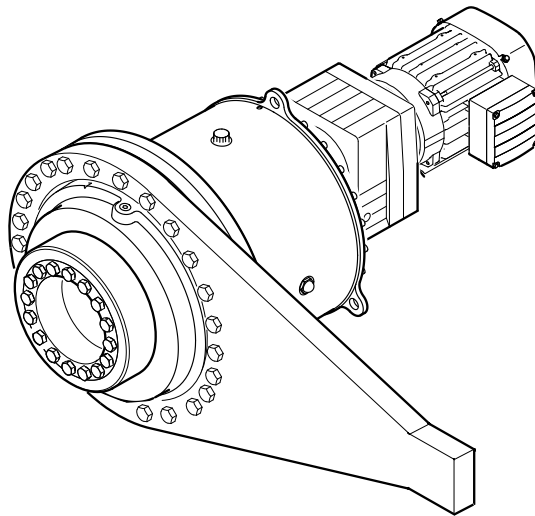
A torque arm is available to support the reaction torque of solid and hollow shaft gear units in the shaft-mounted version.

The torque arm can bear tensile stress as well as thrust loads.

### **4.2.1 Single-sided torque arm**

The torque arm is enclosed in the delivery or can be mounted according to customer requirements. The retaining screws are included in the scope of delivery.

The following figure shows a sample combination of a planetary gearmotor with a torque arm on one side.



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## **4.3 PT100 temperature sensor**

The temperature sensor PT100 can be used to measure the temperature of the oil in the gear unit.

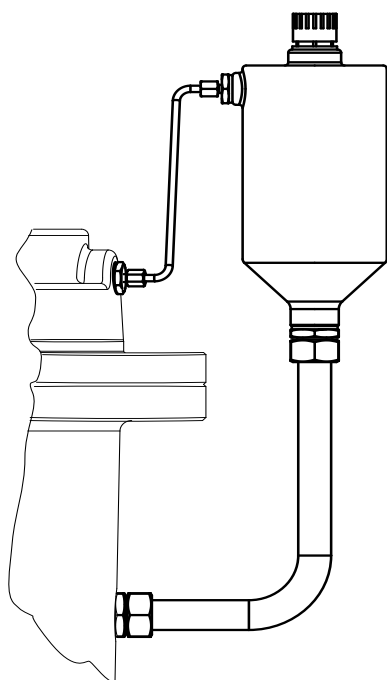
The temperature sensor is located in the gear unit's oil sump. The exact position depends on the gear unit variant.



#### 4.4 Oil expansion tank / oil riser pipe

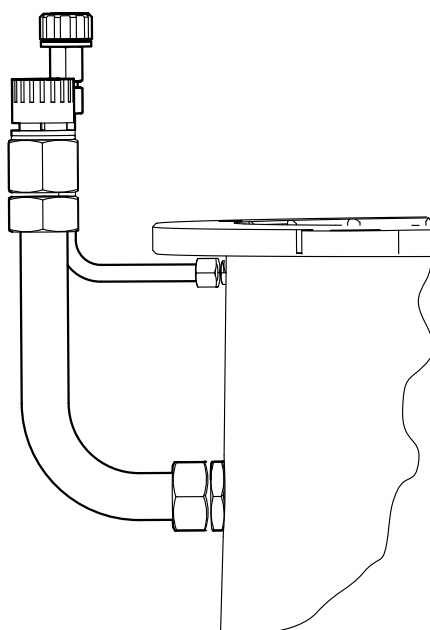
If there is little space available for installing the oil expansion tank (M2 mounting position) or the oil riser pipes (M4 mounting positions), you can request an order-specific dimension drawing from SEW-EURODRIVE.

##### 4.4.1 Oil expansion tank for mounting position M2



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##### 4.4.2 Oil riser pipe for mounting position M4



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## 5 Installation/Assembly

### 5.1 Required tools/resources

Not included in the scope of delivery:

- Set of wrenches
- Torque wrench
- Mounting device
- Compensation elements (shims, spacing rings)
- Fasteners for input and output elements
- Lubricant (e.g. NOCO<sup>®</sup> fluid from SEW-EURODRIVE) → except for hollow shaft gear units
- For hollow shaft gear units → aids for assembly/disassembly onto the machine shaft
- Securing components for the gear unit base

### 5.2 Tolerances

#### 5.2.1 P.. planetary gear unit

*Shaft ends*      Diameter tolerance in accordance with DIN 748:  
 $\varnothing > 50 \text{ mm} \rightarrow \text{ISO m6}$

Center bores:

$\varnothing 120 \dots 210 \text{ mm} \rightarrow \text{M20}$   
 $\varnothing 240 \dots 290 \text{ mm} \rightarrow \text{M24}$

*Mounting flange*      Centering shoulder tolerance: ISO f8

#### 5.2.2 RF../KF.. primary gear unit

*Shaft ends*      Diameter tolerance in accordance with DIN 748:  
 $\varnothing \leq 50 \text{ mm} \rightarrow \text{ISO k6}$   
 $\varnothing > 50 \text{ mm} \rightarrow \text{ISO m6}$

Center bores to DIN 332 D:

$\varnothing > 85 \dots 130 \text{ mm} \rightarrow \text{M24}$   
 $\varnothing > 130 \dots 180 \text{ mm}^{1)} \rightarrow \text{M30}$

1) Dimensions not according to DIN 332; the thread depth including the counterbore is at least twice that of the nominal thread diameter

Keys according to DIN 6885 (domed type)

*Mounting flange*      Centering shoulder tolerance: ISO f7



### 5.3 Notes on installation/mounting



#### **⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- De-energize the motor before you start working on the unit.
- Secure the motor against unintended power-up.



#### **⚠ WARNING**

A customer machine that is not appropriately secured can fall during gear unit installation or removal.

Severe or fatal injuries.

- Safeguard the customer machine against unintentional movement when installing or removing the gear unit.



#### **⚠ WARNING**

Danger of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Only remove the oil level and oil drain plug very carefully.



#### **⚠ CAUTION**

Danger due to unsecured mount-on components, e.g. keys.

Minor injuries

- Install appropriate protective devices.



#### **⚠ CAUTION**

Risk of slipping due to lubricant leaking from damaged seals.

Minor injuries

- Check the gear unit and mount-on components for leaking lubricant.



#### **⚠ CAUTION**

Risk of injury due to protruding parts.

Minor injuries

- Gear units and mount-on components must not protrude into footways.



#### **NOTICE**

Improper installation and mounting may result in damage to the gear unit.

Possible damage to property.

- Note the following:
- Strictly observe the safety notes in the individual chapters.
- The planetary gear units are delivered without oil fill.
- RF../KF.. primary gear units have a lubricant fill in accordance with their mounting position.
- The oil chambers of both gear units are separate. Exceptions are specifically identified as such.



- The most important technical data is provided on the nameplate. Additional data relevant for operation is available in drawings, order confirmations or any order-specific documentation.
- The mounting position may only be changed after consultation with SEW-EURO-DRIVE. The warranty will become void without prior consultation.  
Oil expansion tanks and/or an oil riser pipe are required if you change to a vertical mounting position. Adjust the lubricant fill quantities and the position of the breather valve accordingly.
- Install/mount the gear unit only in the specified mounting position on a level, vibration-damping, and torsionally rigid support structure. Do not twist housing legs and mounting flanges against each other!
- Work on the gear unit only when the machine is not in use. Secure the drive unit against unintentional power-up. Place an information sign near the ON switch to warn that the gear unit is being worked on.
- The plugs for checking and draining oil and the breather valves must be freely accessible.
- Use plastic inserts (2 to 3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel). Also fit the bolts with plastic washers. Always ground the gear unit housing.
- It is important that only authorized personnel is allowed to assemble gear head units with motors and adapters. Consult SEW-EURODRIVE.
- Do not weld anywhere on the drive. Do not use the drive as a ground point for welding work. Welding may destroy gearing parts and bearings.
- Protect rotating drive parts, such as couplings, gears, or belt drives using suitable devices that protect from contact.
- Units installed outdoors must be protected from the sun. Suitable protective devices are required, such as covers or roofs. When using these, avoid heat accumulation. The operator must ensure that foreign objects do not impair the function of the gear unit (e.g. falling objects or coverings).
- Protect the gear unit from direct cold air currents. Condensation may cause water to accumulate in the oil.
- For the standard mounting positions, the breather valve on planetary gear units is mounted at the factory and activated if the gear unit is supplied without an oil fill. Check the correct mounting and the function of the breather valve.
- Gear units are supplied with a coating suitable for use in damp areas or in the open air. Repair any damage to the paint work (e.g. on the breather valve).

#### 5.4 Prerequisites for assembly

Check that the following conditions have been met:

- The information on the motor's nameplate must match the voltage supply system.
- The drive has not been damaged during transportation or storage.
- Ambient temperature according to the technical documentation, nameplate and lubricant table (page 78).
- No harmful oils, acids, gases, vapors, radiation etc. in the vicinity





- You must clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent. Do not expose the sealing lips of the oil seals to the solvent – damage to the material.

#### **5.4.1 Extended storage**

Note: The service life of the lubricant in the bearings is reduced if the unit is stored for  $\geq 1$  year (only applies to bearings with grease lubrication).

Replace the provided breather filter with the screw plug.

#### **5.4.2 Oil filling**

Fill the gear unit with the oil grade and oil volume specified on the nameplate.

- The amount depends on the mounting position and the lubrication type.
- Check the oil level through oil sight glass or with oil stick.



## 5.5 Installing the gear unit

### 5.5.1 Gear unit mounting for foot-mounted units

The following table shows the thread sizes and the tightening torques of the individual gear unit sizes.

Size	Screw/nut	Tightening torque screw / nut Strength class 8.8 [Nm]	Quantity
P002	M20	410	8
P012	M20		
P022	M20		
P032	M24	710	
P042	M30	1450	
P052	M36	2500	
P062	M36		
P072	M42	4000	
P082	M42	4000	



### INFORMATION

The bolts must not be lubricated during assembly.

### 5.5.2 Tightening torques for retaining screws

Apply the following tightening torques to tighten the screws on the gear unit.

Screw/nut	Tightening torque Strength class 8.8 [Nm]
M6	11
M8	25
M10	48
M12	86
M16	210
M20	410
M24	710
M30	1450
M36	2500
M42	4000
M48	6000
M56	9600



### INFORMATION

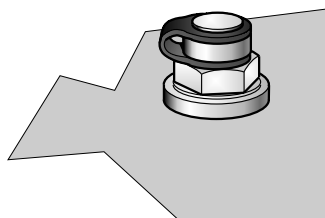
The bolts must not be lubricated during assembly.



### 5.5.3 Breather valve with RF../KF.. primary gear unit

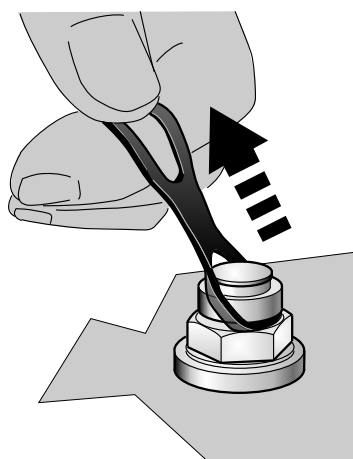
Check whether the breather valve is activated. If the breather valve has not been activated, you must remove the transport fixture from the breather valve before starting up the gear unit!

#### 1. Breather valve with transport fixture



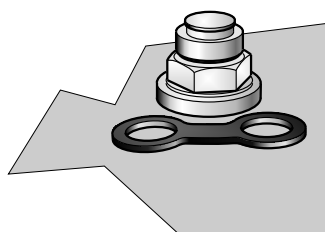
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#### 2. Remove the transport fixture



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#### 3. Activated breather valve



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#### 5.5.4 Foot-mounted gear unit with RF.. / KF.. preliminary gear unit

In case of the following combinations of foot-mounted planetary gear units with RF.. / KF.. primary gear units, the primary gear unit can be lower than the mounting surface.

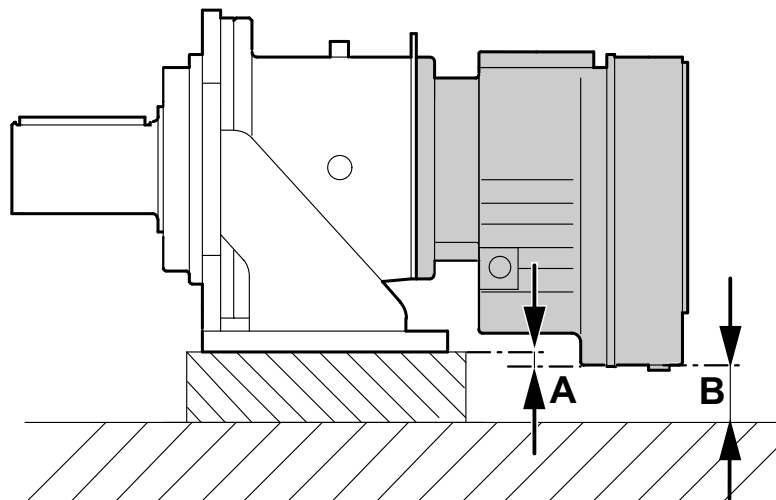


#### INFORMATION

Observe **Dimension A** for the following gear unit combinations. The customer base construction must be prepared accordingly.

In addition, you need enough room to perform an oil change. The customer has to specify a **Dimension B**.

	Size/combinations		Distance A [mm]
	RF..	KF..	
P002	-	97	10
P012	-	107	32.5
P022	-	107	2.5
P022	137	-	7.5
P032	147	-	18.5



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### 5.5.5 Foundation

To ensure quick and successful mounting, the type of foundation should be correctly selected and the mounting carefully planned in advance. Foundation drawings with all necessary construction and dimension details should be available.

To avoid harmful vibrations and oscillations, adequate rigidity must be ensured when mounting the gear unit on a steel construction. The foundation must be dimensioned according to weight and torque of the gear unit by taking into account the forces acting on the gear unit.

Tighten retaining screws or nuts to the specified torque. Use the screws and tightening torques specified in section "Gear unit mounting" (page 38).



#### NOTICE

An improper foundation may result in damages to the gear unit.

Possible damage to property.

- The foundation must be level and flat, the gear unit may not be deformed when the retaining screws are tightened. Unevenness must be leveled out appropriately.
- Refer to the weight information on the nameplate.

### 5.5.6 Aligning the shaft axis



#### ⚠ WARNING

Shafts can break if shaft axes are not aligned exactly.

Severe or fatal injuries.

- Refer to the separate operation instructions regarding the requirements of the couplings.

The service life of the shafts, bearings and couplings depends on the precision of the alignment of the shaft axes with each other.

Always try to achieve zero misalignment. When doing so, you should also consult the special operating instructions regarding the requirements of the couplings, for example.



#### 5.6 Gear units with solid shaft

##### 5.6.1 Mounting input and output components



#### NOTICE

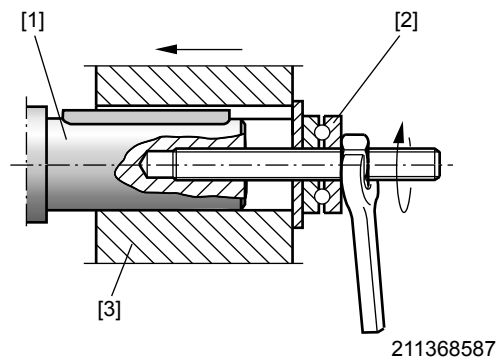
Bearing, housing or shaft may be damaged due to improper assembly.

Possible damage to property.

- Only use a mounting device for installing input and output elements. Use the center bore and the thread on the shaft end for positioning.
- Never force belt pulleys, couplings, pinions, etc. onto the shaft end by hitting them with a hammer. This may damage the bearing, the housing and the shaft.
- If belt pulleys are used, make sure the belt is tensioned correctly in accordance with the manufacturer's instructions.

*Assembly with mounting device*

The following figure shows a mounting device for installing couplings or hubs on gear unit or motor shaft ends. Should you be able to tighten the screw without any problems, you may not need the thrust bearing on the mounting device.

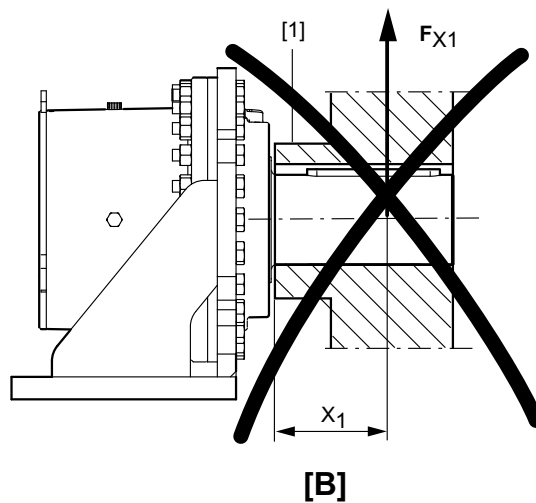
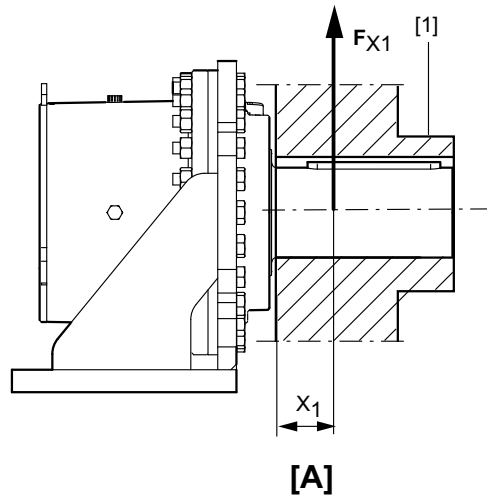


- [1] Gear shaft end
- [2] Thrust bearing
- [3] Coupling hub



Avoid excessive  
overhung loads

Avoid high overhung loads by: Installing the gear or chain sprocket according to figure  
**A** if possible.



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[1] Hub  
[A] correct  
[B] unfavorable



### INFORMATION

Mounting is easier if you first apply lubricant to the output element and/or heat it up briefly (to 80 ... 140 °C).



#### 5.7 Coupling

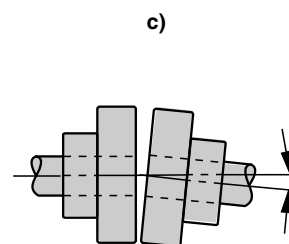
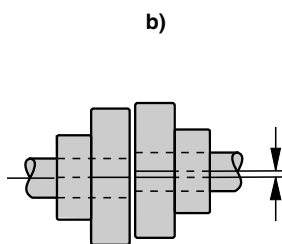
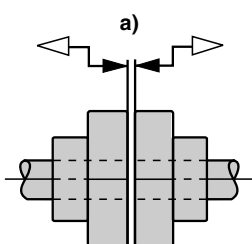


#### INFORMATION

Observe the operating instructions of the respective coupling manufacturer.

Adjust the following misalignments according to the coupling manufacturer's specifications when mounting couplings.

- a) Maximum and minimum clearance
- b) Axial offset
- c) Angular offset



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## 5.8 Coupling of AM adapter



### NOTICE

Dampness might enter the adapter when mounting a motor to the adapter.

Possible damage to property.

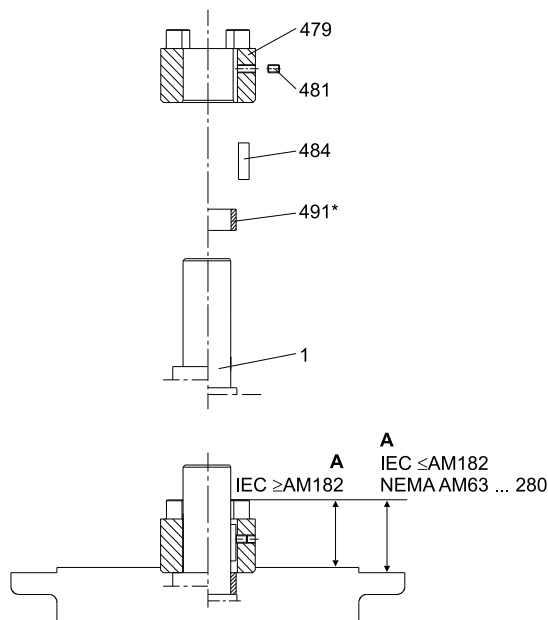
- Seal adapter with anaerobic fluid seal.



### INFORMATION

To avoid contact corrosion, we recommend applying NOCO® Fluid to the motor shaft before mounting the coupling half.

### 5.8.1 IEC adapter AM63 – 280 / NEMA adapter AM56 – 365



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- [1] Motor shaft
- [479] Coupling half
- [481] Setscrew
- [484] Key
- [491] Spacer tube

1. Clean the motor shaft and the flange surfaces of the motor and the adapter.
2. Remove the key from the motor shaft and replace it with the supplied key [484] (not AM63 and AM250).
3. Heat the coupling half [479] to approx. 80 – 100 °C and push the coupling half onto the motor shaft. Position as follows:
  - IEC adapter AM63 – 225 until stop at motor shaft shoulder.
  - IEC adapter AM250 – 280 to dimension **A**.
  - NEMA adapter with spacer tube [491] to dimension **A**.
4. Secure the key and coupling half using the setscrew [481] and tightening torque  $T_A$  according to the table on the motor shaft.
5. Check the dimension **A**.



## Installation/Assembly

### Coupling of AM adapter

6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Mount the motor on the adapter. Ensure that the coupling claw of the adapter shaft is engaged in the plastic cam ring.

IEC AM	63 / 71	80 / 90	100 / 112	132	160 / 180	200	225	250 / 280
A	24.5	31.5	41.5	54	76	78.5	93.5	139
T <sub>A</sub>	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10
NEMA AM	56	143 / 145	182 / 184	213 / 215	254 / 256	284 / 286	324 / 326	364 / 365
A	46	43	55	63.5	78.5	85.5	107	107
T <sub>A</sub>	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10

#### Permitted loads

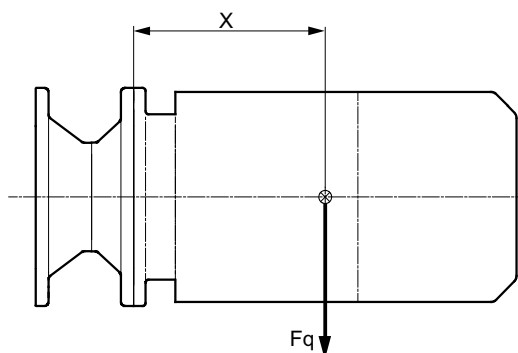


### NOTICE

Impermissibly high loads may occur when mounting a motor.

Potential damage to property

- The load data specified in the following table are not to be exceeded.



Adapter type			F <sub>q</sub> <sup>1)</sup> [N]	
IEC	NEMA	x <sup>1)</sup> [mm]	IEC adapter	NEMA adapter
AM63/71	AM56	77	530	410
AM80/90	AM143/145	113	420	380
AM100/112	AM182/184	144	2000	1760
AM132 <sup>2)</sup>	AM213/215 <sup>2)</sup>	186	1600	1250
AM132..	AM213/215		4700	3690
AM160/180	AM254/286	251	4600	4340
AM200/225	AM324-AM365	297	5600	5250
AM250/280	-	390	11200	-

- 1) The maximum permitted weight of the attached motor F<sub>qmax</sub> must be reduced linearly as the center of gravity distance x increases. If this distance is reduced, the maximum permitted weight F<sub>qmax</sub> cannot be increased.
- 2) Diameter of the adapter output flange: 160 mm



AM../RS adapter  
AM with backstop

Check the direction of rotation of the drive prior to assembly or startup. Inform the SEW-EURODRIVE service in the case of incorrect direction of rotation.

The backstop is maintenance-free in operation, and does not require any further maintenance work. Backstops have a minimum lift-off speed depending on the size (see following table).



#### NOTICE

If the actual speed level is below the minimum lift-off speed level, the backstops are subject to wear, and the resulting friction causes the temperature to increase.

Possible damage to property

- In rated operation, the lift-off speeds must not drop below the minimum values.
- During startup or braking, the lift-off speeds may drop below the minimum levels.

Type	Maximum locking torque of the backstop [Nm]	Minimum lift-off speed [rpm]
AM80/90/RS, AM143/145/RS	45	800
AM100/112/RS, AM182/184/RS	200	670
AM132/RS, AM213/215/RS	470	660
AM160/180/RS, AM254/286/RS	630	550
AM200/225/RS, AM324-365/RS	1430	600

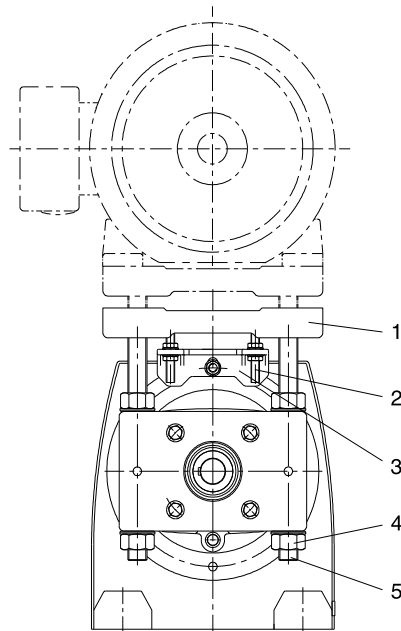


#### 5.9 AD input shaft assembly

Observe section "Mounting the input and output elements" (see section 5.6) when mounting input elements.

##### 5.9.1 Cover with motor mounting platform AD.. / P

Mounting the motor and adjusting the motor mounting platform.



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- [1] Motor mounting platform
- [2] Stud bolt (only AD6/P / AD7/P)
- [3] Support (only AD6/P / AD7/P)

- [4] Nut
- [5] Threaded column

1. Set the motor mounting platform to the required mounting position by evenly tightening the adjusting nuts. Remove the lifting eyebolt from helical gear units in order to achieve the lowest adjustment position. Touch up any damage to the paint work.
2. Align the motor on the motor mounting platform (shaft ends must be in alignment) and secure it.
3. Mount the input elements on the input shaft end and the motor shaft, line them up with one another and correct the motor position again, if necessary.
4. Put on the traction elements (V-belt, chain, etc.) and apply a preload by evenly adjusting the motor mounting platform. Do not stress the motor mounting platform and the columns against each other when doing this.
5. Tighten all the nuts not used for adjustment in order to fix the threaded columns.



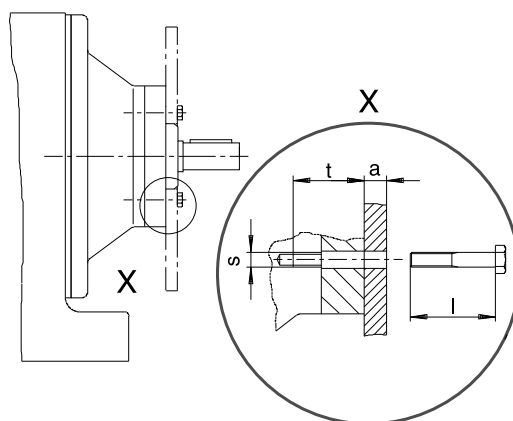
### 5.9.2 Only AD6/P and AD7/P

Unscrew the nuts on the stud bolts before adjustment to allow the stud bolts to move axially in the support without restriction. Do not tighten the nuts until the final adjustment position has been reached. Do not adjust the motor mounting platform using the support.

### 5.9.3 AD../ZR input shaft assembly with centering shoulder

Mounting applications on the input shaft assembly with centering shoulder.

1. Retaining bolts of a suitable length must be used to secure the application. The length  $l$  of the new bolts is calculated as follows:



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- [ $l$ ]  $t+a$   
 [ $t$ ] Screw-in depth (see table)  
 [ $a$ ] Thickness of the application  
 [ $s$ ] Retaining thread (see table)

**Round down the calculated screw length to the next smaller standard length.**

2. Remove the retaining screws from the centering shoulder.
3. Clean the contact surface and the centering shoulder.
4. Clean the threads of the new bolts and apply a bolt locking compound (e.g. Loctite® 243) to the first few threads.
5. Attach the application to the centering shoulder and tighten the retaining screws with the specified tightening torque  $T_A$  (see table).

Type	Screw-in depth $t$ [mm]	Retaining thread $s$	Tightening torque $T_A$ for connection screws of strength class 8.8 [Nm]
AD2/ZR	25.5	M8	25
AD3/ZR	31.5	M10	48
AD4/ZR	36	M12	86
AD5/ZR	44	M12	86
AD6/ZR	48.5	M16	210
AD7/ZR	49	M20	410
AD8/ZR	42	M12	86



### Permitted loads

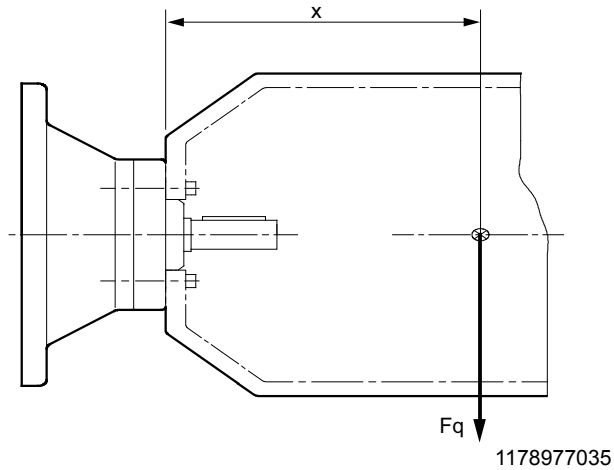


### NOTICE

Impermissibly high loads may occur when mounting a motor.

Potential damage to property

- The load data specified in the following table are not to be exceeded.



Type	$x^{1)}$ [mm]	$F_q^{1)}$ [N]
AD2/ZR	193	330
AD3/ZR	274	1400
AD4/ZR <sup>2)</sup>	361	1120
AD4/ZR		3300
AD5/ZR	487	3200
AD6/ZR	567	3900
AD7/ZR	663	10000
AD8/ZR	516	4300

1) Maximum load values for connection screws of strength class 8.8. The maximum permitted weight of the attached motor  $F_{qmax}$  must be reduced linearly as the center of gravity distance  $x$  increases. When this distance is reduced,  $F_{qmax}$  cannot be increased.

2) Diameter of the adapter output flange: 160 mm



#### 5.9.4 AD.. cover with backstop /RS

Check the direction of rotation of the drive prior to assembly or startup. Inform the SEW-EURODRIVE service in the case of incorrect direction of rotation.

The backstop is maintenance-free in operation, and does not require any further maintenance work. Backstops have a minimum lift-off speed depending on the size (see following table).



#### NOTICE

If the actual speed level is below the minimum lift-off speed level, the backstops are subject to wear, and the resulting friction causes the temperature to increase.

Possible damage to property

- In rated operation, the lift-off speeds must not drop below the minimum values.
- During startup or braking, the lift-off speeds may drop below the minimum levels.

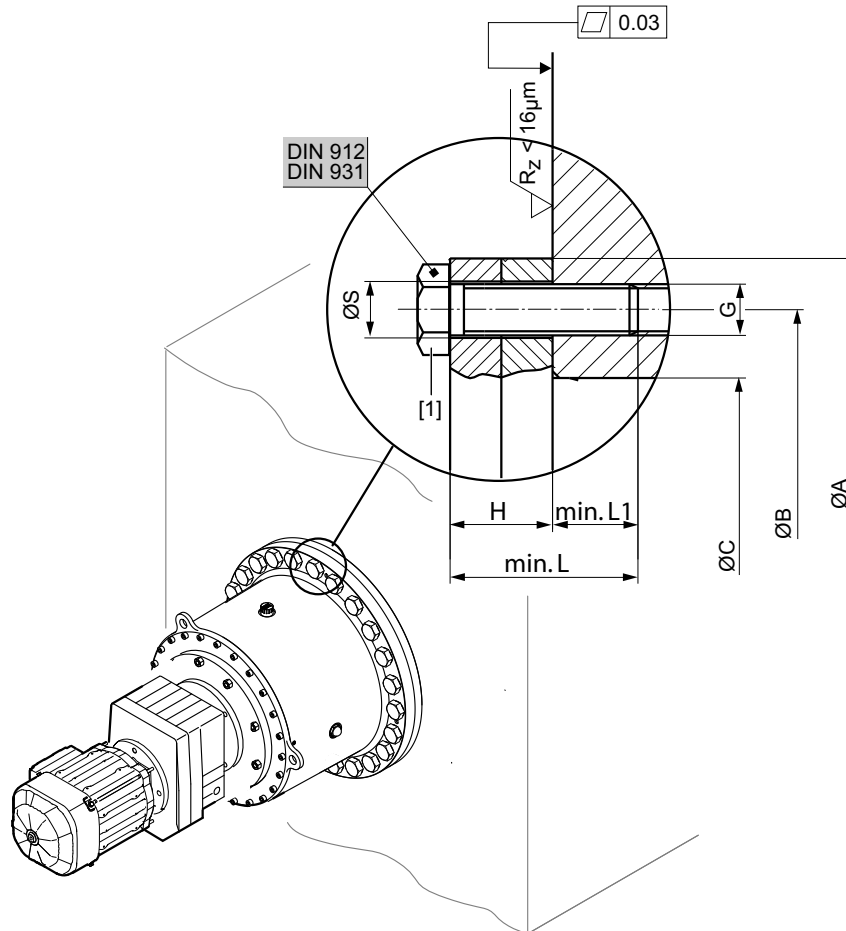
Type	Maximum locking torque of the backstop [Nm]	Minimum lift-off speed [rpm]
AD2/RS	45	800
AD3/RS	200	670
AD4/RS	470	660
AD5/RS	630	550
AD6/RS	1430	600
AD7/RS	1430	600
AD8/RS	1430	600



#### 5.10 Flange-mounted gear unit

When mounting the gear unit to the torque arm and/or machine frame, secure the screws [1] additionally by using Loctite® 640.

The following figure shows an example of how flange-mounted gear units are installed. Retaining screws are not included in the scope of delivery.



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The following values apply to steel constructions.

Size	Thread	Quantity	Tightening torque [Nm] ± 20 %	Dimensions in [mm]							Strength classes	Screws DIN EN ISO
				Ø S	H	min. L	min. L1	Ø A	Ø B	Ø C		
P002	M20	16	579	22	39.5	73.5	34	410	370	330 <sub>f8</sub>	10.9	4017 4762
P012	M20	20	579	22	41.5	73.5	32	450	410	370 <sub>f8</sub>		
P022	M20	24	579	22	48	84	36	500	460	410 <sub>f8</sub>		
P032	M24	20	1000	26	50	84	34	560	510	460 <sub>f8</sub>		
P042	M30	20	2011	33	64	114	50	620	560	480 <sub>f8</sub>		
P052	M30	24	2011	33	64	114	50	650	590	530 <sub>f8</sub>		
P062	M36	24	3492	39	74	134	60	760	690	610 <sub>f8</sub>		
P072	M36	24	3492	39	84	144	60	840	770	690 <sub>f8</sub>		
P082	M42	24	3492	45	84	154	70	920	840	750 <sub>f8</sub>		





## 5.11 Torque arm



### NOTICE

Improper assembling may result in damages to the gear unit.

Possible damage to property

- Do not twist the torque arm during installation.

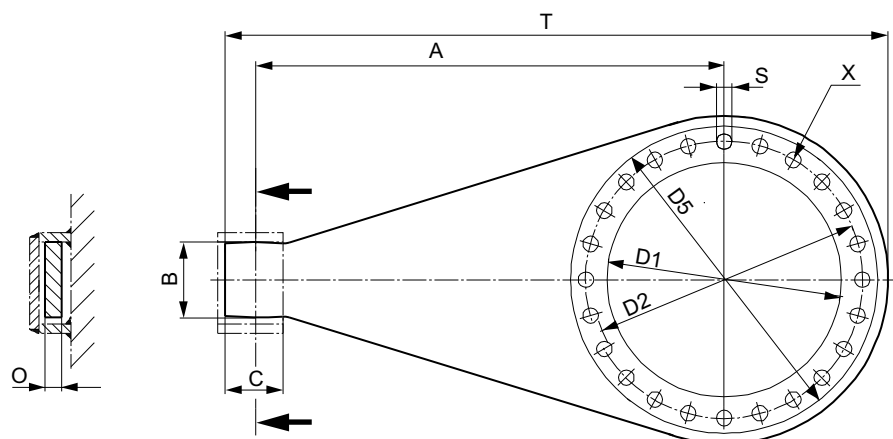
### 5.11.1 Single-sided torque arm (standard)

The reactive force due to the gear unit torque is absorbed via the torque arm with lever arm A. The illustration shows an example of absorption in a welded construction with design dimensions. Two supporting plates are welded with the suggested dimensions on the machine design. Once the gear unit has been mounted, a connecting cover plate is welded onto the two supporting plates. The force of the gear unit torque acts on the support, divided by the length of the lever arm A. The reaction force also acts on the gear unit and machine shafts.

Retaining screws are included in the scope of delivery.

#### Dimensions

The following figure shows a sample torque arm.



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Size	Dimensions in [mm]								Quantity	Weight [Kg]
	A	B	C	D1	D2	O	S	T		
P002	650	60	50	334	370	25	22	880	16	25
P012	700	70	60	374	410	30	22	955	20	35
P022	750	90	70	414	460	35	22	1035	24	48
P032	800	110	90	464	510	35	26	1125	20	58
P042	900	150	120	484	560	40	33	1270	20	93
P052	1000	160	130	534	590	40	33	1390	24	102
P062	1200	180	150	614	690	50	39	1655	24	183
P072	1500	230	200	694	770	60	39	2020	24	317
P082	1600	230	200	754	840	70	45	2160	24	420



### Tightening torques

Size	Thread	Quantity	Tightening torque [Nm] ± 20 %	Strength classes	DIN screws
P002	M20	16	579	10.9	DIN EN ISO 4017 DIN EN ISO 4762
P012	M20	20	579		
P022	M20	24	579		
P032	M24	20	1000		
P042	M30	20	2011		
P052	M30	24	2011		
P062	M36	24	3492		
P072	M36	24	3492		
P082	M42	24	3492		



## 5.12 Output shaft as hollow shaft with shrink disk



### INFORMATION

Ensure that the dimensions of the machine shaft correspond to SEW specifications → see previous page.

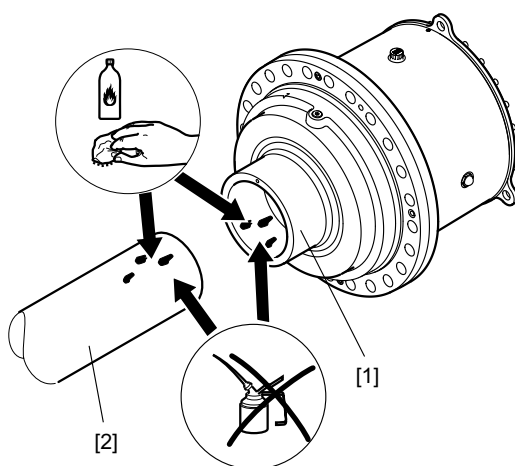


### INFORMATION

Note that the shrink disk is secured with 2 screws on delivery. Remove the screws prior to assembly.

### 5.12.1 Assembly

1. Before installing the shrink disk, clean and degrease the hub [1] and the machine shaft [2]. This is very important for the reliability of torque transmission.



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2. Slide the shrink disk onto the hollow shaft.
  - **CAUTION** The loose shrink disk could slip.  
Risk of injury to persons and damage to property.
    - Secure the shrink disk against slipping.



## Installation/Assembly

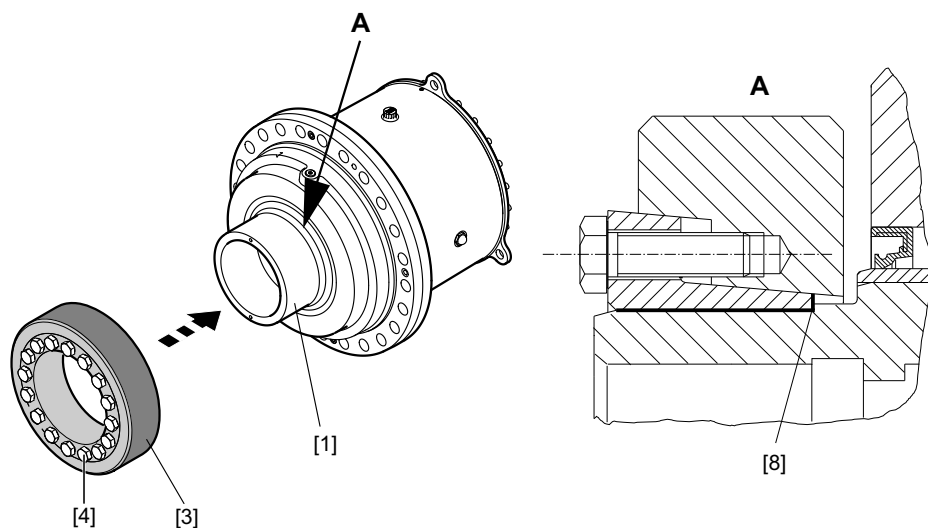
### Output shaft as hollow shaft with shrink disk

3. Check the correct position of the shrink disk [3]. The shrink disk is positioned correctly when it is in contact with the shaft shoulder [8].

- **NOTICE** Tightening the screws [4] without installed shaft may result in the hollow shaft being deformed.

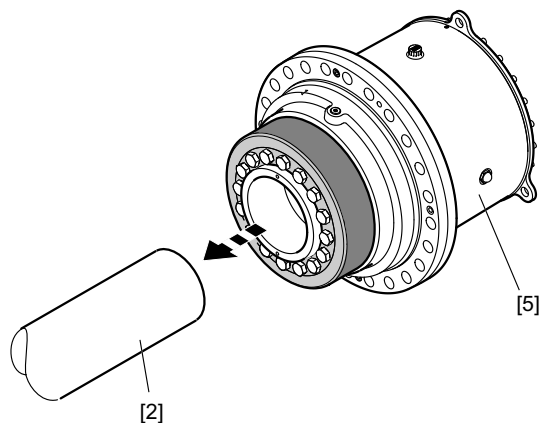
Possible damage to property.

- Never tighten the locking screws [4] without the shaft installed [2].



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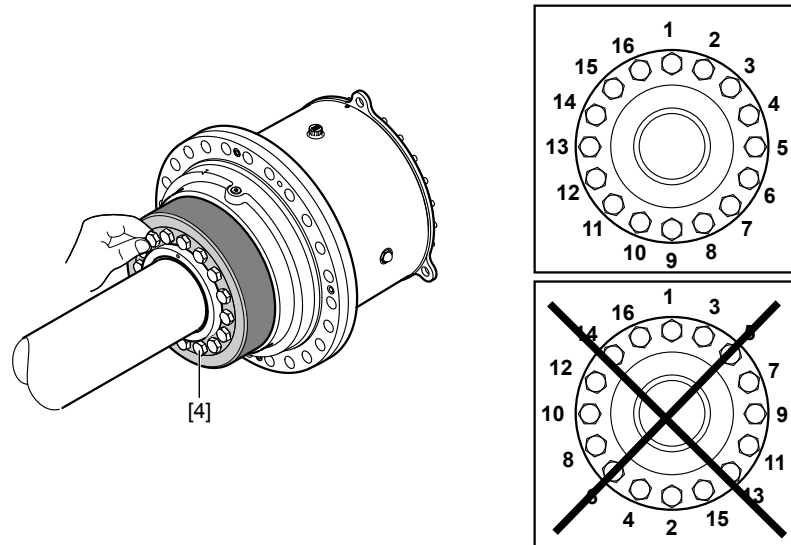
4. Install the machine shaft [2] or slide the gear unit [5] to a stop on the machine shaft [2]. Perform the mounting sequence slowly to allow the compressed air to escape around the outside of the shaft.



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5. Tighten the locking screws [4] manually first. Tighten all locking screws by working round equally (not in diametrically opposite sequence) in 1/4 turn increments.



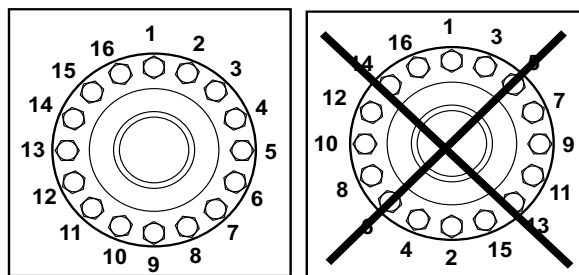
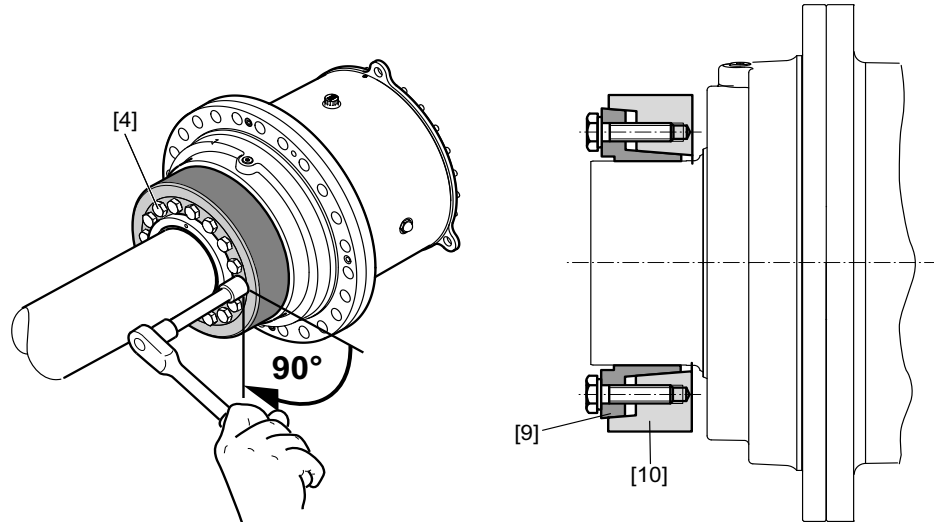
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## Installation/Assembly

### Output shaft as hollow shaft with shrink disk

6. Observe the tightening torque in the table below. Tighten the locking screws [4] by continuing to work round in 1/4 turns until you reach the tightening torque. Additionally, you can visually check to see that the front lateral surfaces are aligned to the inner [9] and outer rings [10].



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Verify the type details on your shrink disk and choose the tightening torque.

Shrink disk type	Size	Screws	Rated torque [Nm]	Tightening torque [Nm] $\pm 20\%$
3191	P002	M16	41000	250
3181	P012	M16	75500	290
	P022	M16	95500	290
	P032	M20	134000	570
	P042	M20	194000	570
	P052	M20	255000	570
	P062	M24	405000	980
	P072	M24	525000	980
	P082	M24	720000	980



### INFORMATION

If the taper (outer ring) and the taper bushing (inner ring) cannot be aligned on the face that holds the screws, disassemble the shrink disk again and carefully clean/lubricate it as shown in the next section.



#### NOTICE

Improper assembly may result in risk of injury due to rotating parts.

Risk of injury to persons and damage to property.

- Be sure to properly attach the protection cover after completing assembly.

#### 5.12.2 Removal



#### NOTICE

Improper disassembly may damage bearings and other components.

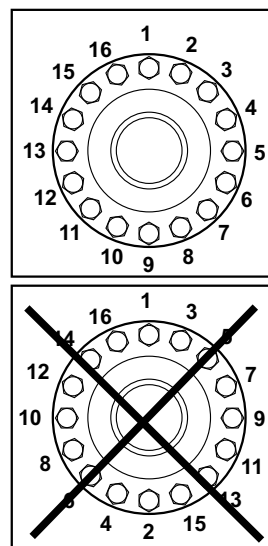
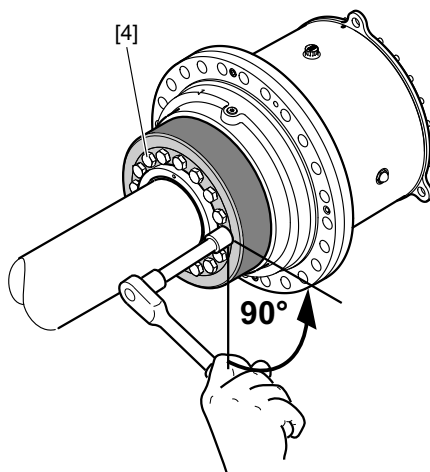
Possible damage to property.

- You may only use the hollow shaft as a support for disassembly. Note that supporting on any other parts of the gear unit may damage the material.
- Remove the shrink disk correctly. Never completely unscrew the retaining screws because the shrink disk might jump off and cause an accident.
- Shrink disks and corresponding parts of different gear units must not be swapped.

1. Loosen the locking screws [4] by a quarter turn one after the other to avoid straining the connecting surface.

- **INFORMATION** If the bevel (outer ring) and the taper bushing (inner ring) [9b] do not separate by themselves:

Take the necessary number of retaining screws and screw them into the removal bores evenly. Tighten the retaining screws in several steps until the tapered bushing separates from the bevel ring.



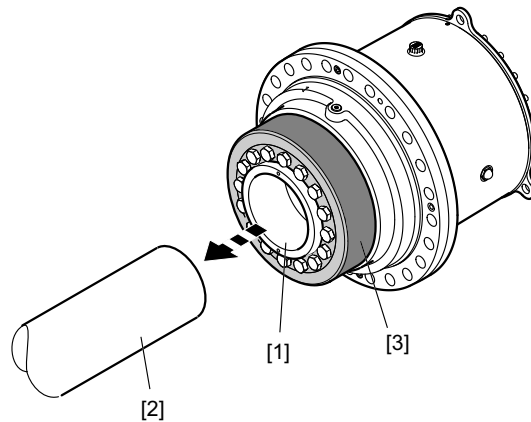
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## Installation/Assembly

### Output shaft as hollow shaft with shrink disk

2. Remove the machine shaft [2] or pull the hub [1] off the customer shaft (first, remove any corrosion, which may have formed between the hub and the shaft end).



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3. Remove the shrink disk [3] from the hub [1].

#### 5.12.3 Cleaning and lubrication



#### INFORMATION

- You must perform the following steps carefully to ensure that the shrink disk functions properly. Use only products that are comparable to the lubricant that is given.
- If the tapered surfaces of the shrink disk are damaged, the shrink disk can no longer be used and must be replaced.

- If the tapered surfaces of the shrink disk are damaged, the shrink disk can no longer be used and must be replaced.
- Do not disassemble and regrease the removed shrink disk before installing it again. Only clean the shrink disk if it is contaminated.
- Next, regrease only the inner sliding surfaces of the shrink disk.
- Use a solid lubricant with a friction factor of  $\mu = 0.04$ .

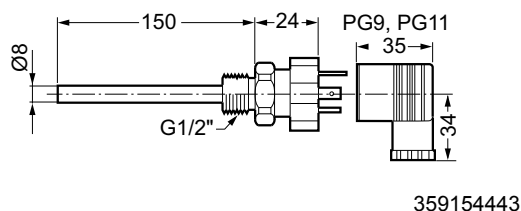
Lubricant	Sold as
Molykote 321 R (lube coat)	Spray
Molykote spray (powder spray)	Spray
Molykote G Rapid	Spray or paste
Aemasol MO 19R	Spray or paste
Molykombin UMFT 1	Spray
Unimoly P5	Powder





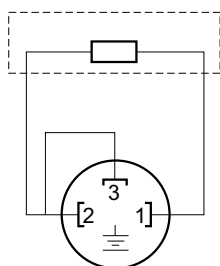
## 5.13 Temperature sensor PT100

### 5.13.1 Dimensions



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### 5.13.2 Electrical connection



359158539

[1] [2] Resistor element connection

### 5.13.3 Technical data

- Variant with immersion sleeves and changeable gauge slide
- Sensor tolerance [K]  $\pm (0.3 + 0.005 \times T)$ , (corresponds to DIN IEC 751 class B),  
T = Oil temperature [°C]
- Plug connector: DIN EN 175301-803 PG9 (IP65)
- The tightening torque for the retaining screw in the back of the plug connector for electrical connection is 0.25 Nm.



## 6 Startup

### 6.1 Important notes on startup



#### NOTICE

Improper startup may result in damage to the gear unit.

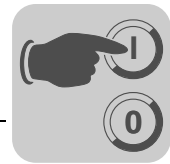
Possible damage to property.

- Note the following:

- RF../KF.. primary gear units are normally delivered with oil fill. Refer to the order documents for discrepancies.
- Check the thermal rating/heating for the following operating conditions:
  - High ambient temperatures (over 45 °C).
  - Mounting position M2/M4 and/or motor speed above 1800 rpm

Contact SEW-EURODRIVE.

- The most important technical data is provided on the nameplate. Additional data relevant for operation is available in drawings, order confirmations or any order-specific documentation.
- Before startup, check that the oil level is correct. Refer to the unit's nameplate for the lubricant fill quantities.
- Ensure that all retaining screws are tight after the gear unit has been installed.
- Make sure that the orientation has not changed after tightening the mounting elements.
- It is essential that there is no open fire or risk of sparks when working on the gear unit.
- Ensure that rotating shafts as well as couplings are equipped with suitable protective covers.
- If there are any oil drain valves, ensure that they cannot be opened unintentionally.
- If an oil sight glass is used, ensure that it is protected against damage.
- Protect the gear unit from falling objects.
- For gear units with long-term protection: Replace the screw plug at the location indicated on the gear unit with a breather plug (position → see order documents).
- Make sure that the monitoring devices are functioning before you start up the unit.
- Strictly observe the safety notes in the individual chapters.



## 6.2 Run-in period

SEW-EURODRIVE recommends running-in the gear unit as the first phase of startup. Increase load and revolutions up to maximum level in 2 to 3 steps. The run-in phase takes approx. 10 hours.

### Note the following during the running-in phase:

- Verify the power values specified on the nameplate at startup because their level and frequency may be a decisive factor for the service life of the gear unit.
- Does the gear unit run smoothly?
- Are there vibrations or unusual running noises?
- Are there signs of leakage (lubricants) on the gear unit?
- Check to be sure that the additional devices (such as oil pump, cooler, etc.) are functioning properly.



### INFORMATION

For further information and troubleshooting measures, refer to the "Malfunctions" section.

## 6.3 Startup of gear units with long-term protection

Adhere to the following points for gear units with long-term protection:

### 6.3.1 anti-corrosion agent

You must clean the output shafts and flange surfaces thoroughly to ensure they are free of anti-corrosion agents, contamination or similar. Use a commercially available solvent. Do not expose the sealing lips of the oil seals to the solvent – damage to the material.

### 6.3.2 Breather plug

Replace the screw plug with the provided breather filter.



### 6.4 Backstop



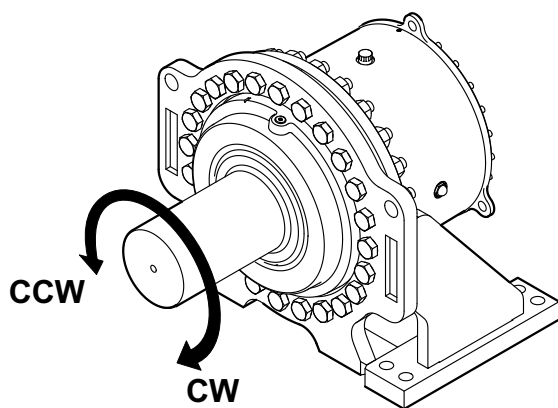
#### NOTICE

Operating the motor in the blocking direction might destroy the backstop.

Possible damage to property

- Do not start up the motor in the blocking direction. Make sure that the motor power supply is correctly attached so that the motor rotates in the required direction. Operating the motor in the blocking direction might destroy the backstop.
- The backstop can be operated in blocking direction with half the output torque once for control purposes.

The backstop is integrated in the AD../RS input shaft assembly. The purpose of it is to prevent undesirable reverse rotation. During operation, the backstop permits rotation in one specified direction of rotation only.

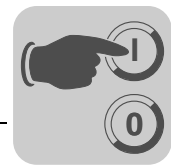


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The direction of rotation is specified as viewed onto the output shaft (LSS):

- Clockwise (CW)
- Counterclockwise (CCW)

The permitted direction of rotation is indicated on the housing.



## 6.5 Measuring the surface and oil temperature

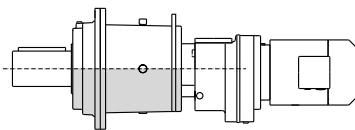
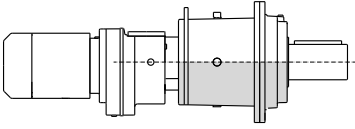
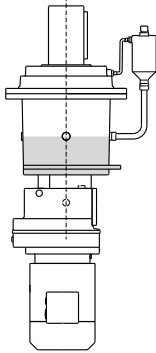
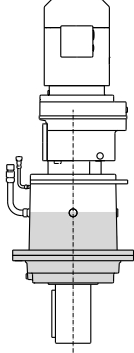
### 6.5.1 Measuring the surface temperature

It is essential to measure the surface temperature under maximum load when starting up the gear unit.

The measurement can be made using commercially available thermometers. The surface temperature must be measured in a steady state condition. It may not exceed 100 °C.

Stop the drive immediately if the temperature is above this value. Consult SEW-EURODRIVE.

The measuring of the surface temperature depends on the mounting position of the planetary gear unit. The area marked in gray shows where the surface temperature of the gear unit must be measured.

Mounting position	Measuring point of the surface temperature
M1	 <p>1407712779</p>
M3 M5 M6	 <p>1407716363</p>
M2	 <p>1407720075</p>
M4	 <p>1407761675</p>



#### 6.5.2 Measuring the oil temperature

Oil temperatures must be measured to determine the oil change intervals. See "Lubricant change intervals" section 7.3 for a description. Measure the temperature at the bottom of the gear unit. If the gear unit has an oil drain plug, measure the temperature on this plug. Add 10 K to the measured value. This value is the basis for the oil change intervals.

#### 6.6 Gear unit shutdown/conservation



##### **⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

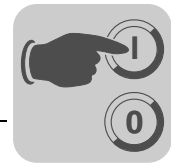
Severe or fatal injuries.

- De-energize the motor before you start working on the unit.
- Secure the motor against unintended power-up.

Additional conservation measures are required if the gear unit is to be shut-down for a longer period. Depending on the location, the ambient conditions, and the lubrication state, even a few weeks of downtime might require conservation measures.

##### 6.6.1 Internal conservation

- **New or hardly used gear units:**
  - For internal conservation, SEW-EURODRIVE recommends the VCI conservation method.
  - Apply the required amount of VCI anti-corrosion agent to the inside of the gear unit (e.g. FUCHS LUBRITECH Anticorit VCI UNI IP-40, [www.fuchs-lubritech.com](http://www.fuchs-lubritech.com)). The amount depends on the free space inside the gear unit. Usually any existing oil may remain in the drive.
  - Replace the breather filter with a screw plug and close the gear unit so that it is air tight. The breather filter must be installed correctly again before startup.
- **After longer gear unit operation:**
  - As, after longer operating periods, the oil might be contaminated (oil sludge, water, etc.), drain the oil and thoroughly rinse the inside of the gear unit with new oil prior to conservation. Observe the information in section "Changing the oil" in the corresponding operating instructions. The inside of the gear unit can then be conserved as described above.



### INFORMATION

For gear units with contactless sealing systems, consult SEW-EURODRIVE.

For gear units without contactless sealing systems, you may also use the oil type indicated on the nameplate to perform the conservation. In this case, the gear unit must be completely filled with clean oil. Replace the breather filter with a screw plug and fill in the oil from the highest point of the gear unit. In order to provide for sufficient conservation, all the gearing and bearing components must be completely covered in oil.

Prior to startup, re-install the breather filter. Observe the information on the nameplate regarding the oil type and quantity.

#### 6.6.2 External conservation

- Clean the respective surfaces
- Grease the shaft near the sealing lip to separate the sealing lip of the oil seal and the sealing compound.
- Apply a wax-based protective coating to shaft ends and unpainted surfaces as external corrosion protection (e.g. Herm Hölterhoff Hölterol MF 1424, [www.hoelterhoff.de](http://www.hoelterhoff.de)).



### INFORMATION

Consult with the respective supplier regarding the compatibility with the oil that is used and the length of corrosion protection for your particular gear unit version.

Observe the information in section "Storage and Transport Conditions" in the corresponding operating instructions. This section provides information on the possible storage periods in conjunction with adequate packaging – depending on the storage location.

Prior to re-startup, observe chapter "Startup" in the corresponding operating instructions.



## 7 Inspection/Maintenance

### 7.1 Preliminary work regarding inspection/maintenance

Observe the following notes before you start with the inspection/maintenance work.



#### **⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- De-energize the motor before you start working on the unit.
- Secure the motor against unintended power-up.



#### **⚠ WARNING**

A customer machine that is not appropriately secured can fall during gear unit installation or removal.

Severe or fatal injuries.

- Safeguard the customer machine against unintentional movement when installing or removing the gear unit.



#### **⚠ WARNING**

Danger of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Only remove the oil level and oil drain plug very carefully.



#### **NOTICE**

Filling in the wrong oil may result in significantly different lubricant characteristics.

Possible damage to property.

- Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.



#### **NOTICE**

Improper maintenance may result in damage to the gear unit.

Possible damage to property.

- Note the following:
- Strict adherence to the inspection and maintenance intervals is absolutely necessary to ensure safe working conditions.
- Observe the tightening torques.
- When using primary gearmotors, also observe the maintenance notes for motors and primary gear units in the accompanying operating instructions.
- For the position of the oil level plug, oil drain plug and the breather valve, refer to the mounting position sheets (page 21).
- Use only original spare parts according to the delivered spare and wearing parts lists.
- Before releasing shaft connections, be sure that there are no active torsional moments present (tensions within the system).





- Note that planetary gear unit and preliminary gear unit have 2 separate oil chambers.
- Prevent foreign bodies from entering into the gear unit during the following work.
- Do not clean the gear unit with a high-pressure cleaning system as water might enter the gear unit and the seals might be damaged.
- Perform safety and function tests following all maintenance and repair work.
- Strictly observe the safety notes in the individual chapters.

## **7.2 Inspection and maintenance intervals**

### **7.2.1 P.. planetary gear unit**

Time interval	Required steps
<ul style="list-style-type: none"> <li>• <b>Daily</b></li> </ul>	<ul style="list-style-type: none"> <li>• Check the housing temperature:                             <ul style="list-style-type: none"> <li>• with mineral oil: max. 90 °C</li> <li>• with synthetic oil: max. 100 °C</li> </ul> </li> <li>• Check gear unit noise</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Monthly</b></li> </ul>	<ul style="list-style-type: none"> <li>• Check gear unit for signs of leakage</li> <li>• Checking the oil level (section 7.4)</li> </ul>
<ul style="list-style-type: none"> <li>• <b>After 500 hours of operation</b></li> </ul>	<ul style="list-style-type: none"> <li>• First oil change after initial startup (chapter 7.6)</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Every 3000 operating hours, at least every 6 months</b></li> </ul>	<ul style="list-style-type: none"> <li>• Check the oil consistency (chapter 7.5)</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Depending on the operating conditions, at least every 6 months</b></li> </ul>	<ul style="list-style-type: none"> <li>• Fill regreasable sealing systems with grease (section 7.8).</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Depending on the operating conditions, at least every 12 months</b></li> </ul>	<ul style="list-style-type: none"> <li>• Check whether retaining screws are tightly secured</li> <li>• Clean oil filter, replace filter element if necessary</li> <li>• Checking the breather plug, replacing it if required (chapter 7.7)</li> <li>• Check the alignment of the input and output shafts (chapter 5.6)</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Depending on the operating conditions (see chapter 7.3), every 3 years at the latest.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Change mineral oil</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Depending on the operating conditions (see chapter 7.3), every 5 years at the latest.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Change synthetic oil</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Varying (depending on external factors)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Touch up or renew the surfaces/anticorrosion coating</li> </ul>



#### 7.2.2 RF/KF primary gear unit

Time interval	Required maintenance/inspection steps
<ul style="list-style-type: none"> <li>Every 3000 operating hours, at least every 6 months</li> </ul>	<ul style="list-style-type: none"> <li>Check oil and oil level</li> <li>Check running noise for possible bearing damage</li> <li>Visually check the seals for leakage</li> </ul>
<ul style="list-style-type: none"> <li>Depending on the operating conditions, every 3 years at the latest</li> <li>According to oil temperature</li> </ul>	<ul style="list-style-type: none"> <li>Change mineral oil</li> <li>Replace anti-friction bearing grease (recommendation)</li> <li>Replace oil seal (do not install it in the same track)</li> </ul>
<ul style="list-style-type: none"> <li>Depending on the operating conditions, every 5 years at the latest</li> <li>According to oil temperature</li> </ul>	<ul style="list-style-type: none"> <li>Change synthetic oil</li> <li>Replace anti-friction bearing grease (recommendation)</li> <li>Replace oil seal (do not install it in the same track)</li> </ul>
<ul style="list-style-type: none"> <li>Varying (depending on external factors)</li> </ul>	<ul style="list-style-type: none"> <li>Touch up or renew the surfaces/anticorrosion coating</li> </ul>

#### 7.2.3 AL/AM adapter

Time interval	Required maintenance/inspection steps
<ul style="list-style-type: none"> <li>Every 3000 operating hours, at least every 6 months</li> </ul>	<ul style="list-style-type: none"> <li>Check torsional play</li> <li>Visually check the elastic annular gear</li> <li>Check running noise for possible bearing damage</li> <li>Visually check the adapter for leakage</li> </ul>
<ul style="list-style-type: none"> <li>After 25 000 – 30 000 hours of operation</li> </ul>	<ul style="list-style-type: none"> <li>Renew the anti-friction bearing grease</li> <li>Replace oil seal (do not install it in the same track)</li> <li>Change the elastic annular gear</li> </ul>

#### 7.2.4 AD input shaft assembly

Time interval	Required maintenance/inspection steps
<ul style="list-style-type: none"> <li>Every 3000 operating hours, at least every 6 months</li> </ul>	<ul style="list-style-type: none"> <li>Check running noise for possible bearing damage</li> <li>Visually check the adapter for leakage</li> </ul>
<ul style="list-style-type: none"> <li>After 25 000 – 30 000 hours of operation</li> </ul>	<ul style="list-style-type: none"> <li>Renew the anti-friction bearing grease</li> <li>Replace the oil seal</li> </ul>



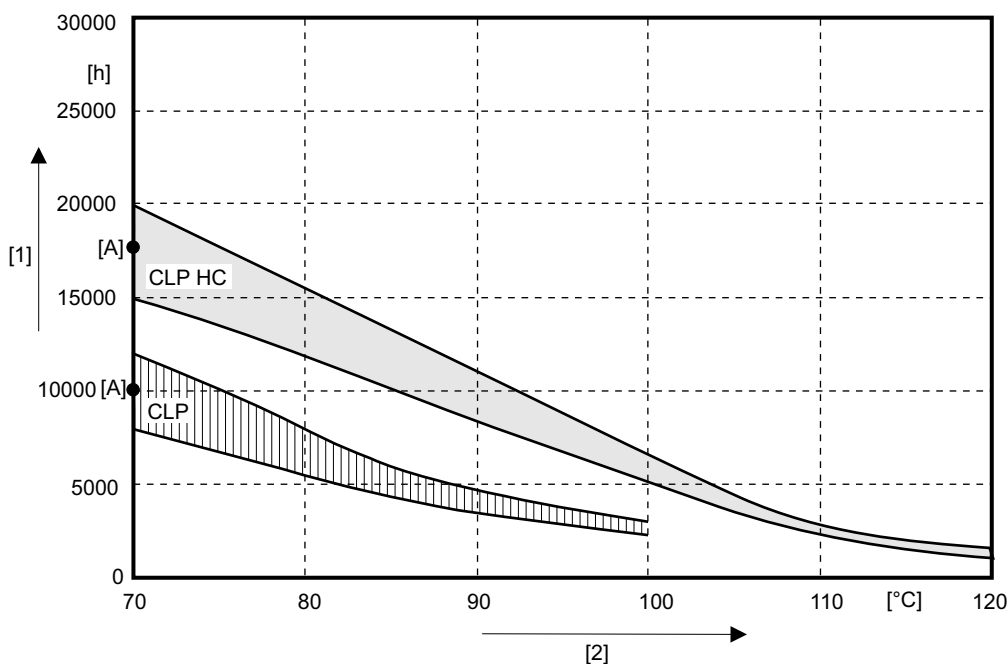
### 7.3 Lubricant change intervals

Change the oil more frequently when using special designs subject to more severe/aggressive ambient conditions.



#### INFORMATION

Mineral CLP lubricants and synthetic polyalphaolefin-based (PAO) lubricants are used for lubrication. The synthetic lubricant CLP HC (according to DIN 51502) shown in the following illustration corresponds to the PAO oils.



- [1] Operating hours  
[2] Sustained oil bath temperature  
● Average value per oil type at 70 °C



#### INFORMATION

SEW-EURODRIVE recommends that the gear unit oil be analyzed regularly (see chapter 7.5) to optimize the lubrication change intervals.



#### 7.4 Oil level check

Note the following:



#### INFORMATION

Do not check the oil level when the gear unit is warm.

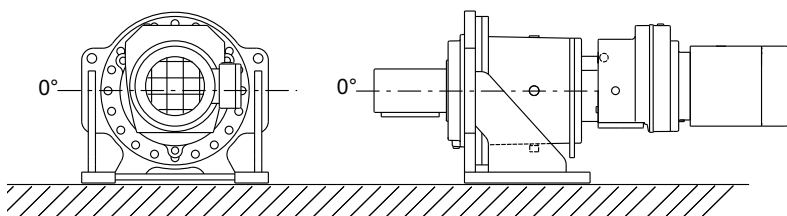


#### INFORMATION

Check the oil level for **standard mounting positions** and **pivoted mounting positions** with the gear unit in the final mounting position.

For **variable mounting positions** have the gear unit in the initial mounting position prior to the oil level check and observe the information provided on the drive and in the order-specific documentation.

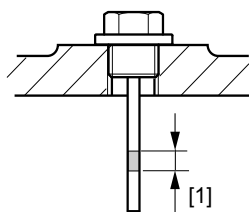
Example using M1 as initial mounting position:



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##### 7.4.1 Gear units with oil dipstick

1. Observe the notes in chapter "Preliminary work regarding inspection/maintenance (page 68)".
2. Unscrew and remove the oil dipstick.
3. Clean the oil dipstick and re-insert it by turning it hand-tight into the gear unit up to the stop.
4. Remove the oil dipstick and check the oil level.



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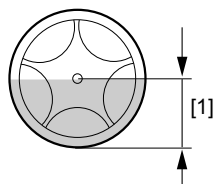
[1] The oil level must be within this range

5. Proceed as follows if the oil level is too low:
  - Open the oil fill plug.
  - Fill in new oil of the same type via the oil fill plug up to the mark.
  - Screw in the oil fill plug.
6. Re-insert the oil stick.



#### 7.4.2 Gear unit with oil sight glass

1. Observe the notes in chapter "Preliminary work regarding inspection/maintenance (page 68)".
2. Check the oil level according to the following figure.



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[1] The oil level must be within this range

3. Proceed as follows if the oil level is too low:
  - Open the oil fill plug.
  - Fill in new oil of the same type via the oil fill plug up to the mark.
  - Screw in the oil fill plug.

#### 7.5 Oil consistency check

1. Observe the notes in chapter "Preliminary work regarding inspection/maintenance (page 68)".
2. Determine the position of the oil drain plug and place a container underneath.
3. Unscrew the oil drain plug slowly and take an oil sample.
4. Re-insert the oil drain plug.
5. Check the oil consistency:
  - For more detailed information on checking the oil for water content and viscosity, contact your lubricant manufacturer.
  - If you can see that the oil is heavily contaminated, change the oil even if this is outside the specified oil change intervals.



## 7.6 Changing the oil

### 7.6.1 Notes



#### NOTICE

Improper oil change may result in damage to the gear unit.

Possible damage to property.

- Note the following:

- Perform the oil change quickly after you have switched off the gear unit in order to prevent solids from settling. You should drain the oil while it is still warm. Avoid temperatures of more than 50 °C.
- When changing the oil, always refill the gear unit with the grade of oil that was used before. Mixing oils of different grades and/or manufacturers is not permitted. Especially synthetic oils may not be mixed with mineral oils or other synthetic oils. Flush the gear unit with the new oil grade thoroughly when switching from mineral oil and/or when switching from synthetic oil of one basis to synthetic oil of a different basis.
- Refer to the lubrication table in section 9.2 to determine which oils from the various lubricant manufacturers can be used.
- Information such as the oil grade, oil viscosity and required oil quantity is listed on the nameplate of the gear unit. The oil quantity specified on the nameplate is an approximate quantity. The mark on the oil sight glass or stick is the decisive indicator of the correct oil level.
- Only change the oil when the gear unit is warm.
- When changing the oil, flush the gear unit interior thoroughly with oil to remove oil sludge, oil residue, and abrasion. Use the same grade of oil that is used to operate the gear unit. Fill with fresh oil only after all residues have been removed.
- For the position of the oil level plug, oil drain plug and the breather valve, refer to the order documents.
- Dispose of the used oil in accordance with applicable regulations.



## 7.6.2 Procedure



### **⚠ WARNING**

Danger of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Only remove the oil level and oil drain plug very carefully.

1. Observe the notes in chapter "Preliminary work regarding inspection/maintenance (page 68)".
2. Place a suitable container underneath the oil drain plug.
3. Remove the oil drain plug.
4. Remove the oil fill plug or the breather valve.  
If a gear unit has no oil fill plug depending on the mounting position, the breather valve is used as oil filling hole.
5. Drain all the oil.
6. Re-insert the oil drain plug.
7. Fill in new oil of the same grade via the oil filling hole.
  - Use a funnel to fill the oil (filter mesh max. 25 µm).
  - Fill the oil according to the quantity specified on the nameplate. The oil quantity specified on the nameplate is an approximate value.
  - Check whether the oil level is correct using the oil sight glass/oil stick.
  - When using an external oil/air or oil/water cooling system, observe the separate operating instructions.
8. Screw in the oil fill plug or the breather valve.



### **INFORMATION**

Remove any dripping oil immediately with an oil binding agent.



### 7.7 Checking and cleaning the breather



#### NOTICE

Improper cleaning may result in damages to the gear unit.

Possible damage to property

- Prevent foreign objects from entering into the gear unit.
- 

1. Observe the notes in chapter "Preliminary work regarding inspection/maintenance (page 68)".
2. Remove any deposits located near the breather plugs.
3. Replace clogged breather plugs with new ones.

### 7.8 Refilling grease

Observe the notes in chapter "Preliminary work regarding inspection/maintenance (page 68)".

Regreasable sealing systems may be refilled with lithium-soap grease (see section 9.4). Use moderate pressure to force grease into each lubrication point until new grease leaks out of the sealing gap.

Used grease, including contaminants and sand, is thus pressed out of the sealing gap.



#### INFORMATION

Immediately remove the old grease that leaked out.

---





## 8 Lubricants

### 8.1 Lubricant selection



#### NOTICE

Selecting improper lubricants may damage the gear unit.

Possible damage to property.

- Note the following:

- The oil viscosity and type (mineral/synthetic) that are to be used are determined by SEW-EURODRIVE specifically for each order. This information is noted in the order confirmation and on the gear unit's nameplate.

You must contact SEW-EURODRIVE in case of a deviation from this specification.

The lubricant recommendation in the lubricant table in no way represents a guarantee regarding the quality of the lubricant delivered by each respective supplier. Each lubricant manufacturer is responsible for the quality of its product.

- Ensure that the planetary gear units and primary gear units are filled with the correct oil grade and volume before startup. You can obtain the corresponding information from the gear unit nameplate and the lubricant table on the following page.
- The lubricant fill quantity and viscosity with planetary geared motors with shared oil chamber depends only on the information on the nameplate of the planetary gear unit. Planetary gear units and the primary gear units are delivered without oil fill.
- Do not mix different synthetic lubricants and do not mix synthetic with mineral lubricants.



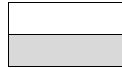
#### 8.2 Lubricant table

The lubricant table shows the permitted lubricants for SEW-EURODRIVE gear units. Consider the used abbreviations, meaning of shading and notes.

CLP = Mineral oil

CLP HC = Synthetic polyalphaolefin

E = Ester oil (water hazard classification 1)



= Mineral lubricant

= Synthetic lubricant

3) = Lubricants may only be used if service factor  $F_s \geq 1.3$

4) = Take into account critical startup behavior at low ambient temperatures

6) = Ambient temperature



= Lubricant for the food industry (food grade oil)



= Biodegradable oil (lubricant for agriculture, forestry, and water management)



#### NOTICE

Selecting improper lubricants may damage the gear unit.

Possible damage to property.

- Contact SEW-EURODRIVE if you operate the unit under extreme conditions, such as cold, heat, or if the operating conditions have changed since project planning.



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6) °C -50 0 +50 +100 Standard -10 +40 -20 +20 -15 +30 -5 +45 0 +50 Standard -25 +40 4) -40 +10 4) -35 +20 -30 +30 -20 +50 -10 +60 -10 +30 -20 +20 4) -40 -10 -20 +40	DIN (ISO)	ISO, NLGI	Mobil®	Shell	bp	KLÜBER LUBRICATION	ARAL	TEXACO	Castrol	FUCHS	Q8	TOTAL
	CLP CC	VG 320	Mobilgear XMP 320 Mobilgear 600XP 320	Shell Omala F 320	BP Energol GR-XP-320	Klüberoil GEM 1-320 N	Aral Degol BG 320	Meropa 320	Alpha SP 320 Tribol 1100/320	Renolin CLP 320 Plus Renolin High Gear 320	Goya NT 320	Carter EP 320
	CLP CC	VG 150 <sup>3)</sup>	Mobilgear XMP 150 Mobilgear 600XP 150		BP Energol GR-XP-150	Klüberoil GEM 1-150 N	Aral Degol BG 150	Meropa 150	Alpha SP 150 Tribol 1100/150	Renolin CLP 150 Plus Renolin High Gear 150	Goya NT 150	
	CLPCC	VG 220	Mobilgear XMP 220 Mobilgear 600XP 220	Shell Omala F 220	BP Energol GR-XP-220	Klüberoil GEM 1-220 N	Aral Degol BG 220	Meropa 220	Alpha SP 220 Tribol 1100/220	Renolin CLP 220 Plus Renolin High Gear 220	Goya NT 3220	Carter EP 220
	CLP CC	VG 460	Mobilgear XMP 460 Mobilgear 600XP 460	Shell Omala F 460	BP Energol GR-XP-460	Klüberoil GEM 1-460 N	Aral Degol BG 460	Meropa 460	Alpha SP 460 Tribol 1100/460	Renolin CLP 460 Plus Renolin High Gear 460	Goya NT 460	Carter EP 460
	CLP CC	VG 680	Mobilgear XMP 680 Mobilgear 600XP 680	Shell Omala F 680	BP Energol GR-XP-680	Klüberoil GEM 1-680 N		Meropa 680	Alpha SP 680 Tribol 1100/680	Renolin CLP 680 Plus Renolin High Gear 680	Goya NT 680	Carter EP 680
	CLP HC	VG 320	Mobilgear SHC XMP 320 Mobil SHC 632	Shell Omala HD 320	BP Enersyn EP-XF-320	Klübersynth GEM 4-320 N		Pinnacle EP 320	Alphasyn EP 320	Renolin CLP 320 Plus Synth 320	El Greco 320	Carter SH 320
4) -40 +10	CLP HC	VG 68 <sup>3)</sup>	Mobil SHC 626	Shell Omala HD 68	BP Enersyn EP-XF-68	Klübersynth GEM 4-68 N				Reolin Unisyn CLP 68		
4) -35 +20	CLP HC	VG 150	Mobilgear SHC XMP 150 Mobil SHC 629	Shell Omala HD 150	BP Enersyn EP-XF-150	Klübersynth GEM 4-150 N		Pinnacle EP 150	Alphasyn EP 150	Reolin Unisyn CLP 150	El Greco 150	Carter SH 150
-30 +30	CLP HC	VG 220	Mobilgear SHC XMP 220 Mobil SHC 630	Shell Omala HD 220	BP Enersyn EP-XF-220	Klübersynth GEM 4-220 N		Pinnacle EP 220	Alphasyn EP 220	Renolin CLP 320 Plus Renolin High Gear Synth 220	El Greco 220	Carter SH 220
-20 +50	CLP HC	VG 460	Mobilgear SHC XMP 460 Mobil SHC 634	Shell Omala HD 460	BP Enersyn EP-XF-460	Klübersynth GEM 4-460 N		Pinnacle EP 460	Alphasyn EP 460	Renolin CLP 320 Plus Renolin High Gear Synth 460	El Greco 460	Carter SH 460
-10 +60	CLP HC	VG 680	Mobilgear SHC XMP 680 Mobil SHC 636	Shell Omala HD 680	BP Enersyn EP-XF-680	Klübersynth GEM 4-680 N		Pinnacle EP 680		Reolin Unisyn CLP 680	El Greco 680	Carter SH 680
-10 +30	CLP HC	VG 68 <sup>3)</sup>		Shell Cassida Fluid GL 68		Klüberöl 4UH1-68 N				Geralyn SF 460		
-20 +20	NSF H1	VG 220 <sup>3)</sup>		Shell Cassida Fluid GL 220		Klüberöl 4UH1-220 N						
4) -40 -10		VG 460 <sup>3)</sup>		Shell Cassida Fluid GL 460		Klüberöl 4UH1-460N						
-20 +40	E	VG 460				Klüberbio CA2-460			Tribol BIO TOP 1418/460	Plantogear 460 S		



### 8.3 Lubricant fill quantities

The specified fill quantities are **recommended values**. The precise values vary depending on the number of stages and gear ratios.

Check the oil level in a planetary gear unit at the oil sight glass or the dipstick and in a primary gear unit at the oil level screw.



#### INFORMATION

In case of a pivoted mounting position, refer to the oil fill quantity specified on the nameplate.

#### 8.3.1 Planetary gear units

Size	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
P002	4	7	4	7	4	4
P012	6	11	6	11	6	6
P022	8	14	8	14	8	8
P032	11	20	11	20	11	11
P042	15	29	15	29	15	15
P052	20	38	20	38	20	20
P062	25	48	25	48	25	25
P072	30	58	30	58	30	30
P082	40	83	40	83	40	40

#### 8.3.2 Helical (RF-) primary gear units

The lubricant fill quantity depends on the mounting position of the planetary gear unit and the mounting position of the RF primary gearmotor.

For notes on the mounting positions of RF primary gear units, refer to section 3.4.2.

Delivery of the RF primary gear unit with oil fill.

Size	Fill quantity in liters					
	M1 0°	M2 0°	M3 180°	M4 0°	M5 270°	M6 90°
RF77	1.2	3.10	3.30	3.60	2.40	3.00
RF87	2.4	6.4	7.1	7.2	6.3	6.4
RF97	5.1	11.9	11.2	14.0	11.2	11.8
RF107	6.3	15.9	17.0	19.2	13.1	15.9
RF137	9.5	27.0	29.0	32.5	25.0	25.0
RF147	16.4	47.0	48.0	52.0	42.0	42.0
RF167	26.0	82.0	78.0	88.0	65.0	71.0

#### Key

M1 / M2 / M3 / M4 / M5 / M6	= Mounting position of planetary gear unit
0° / 90° / 180° / 270°	= Mounting position of primary helical gear unit



### 8.3.3 Primary bevel (KF-) gear units

The lubricant fill quantity depends on the mounting position of the planetary gear unit and the mounting position of the KF primary gearmotor.

For notes on the mounting positions of KF primary gear units, refer to section 3.4.1.

Delivery of the KF primary gear unit with oil fill.

Size	Fill quantity in liters											
	M1				M2				M3			
	0° A	90° A	180° B	270° A	0° A	90° A	180° A	270° A	0° B	90° A	180° A	270° A
KF67	1.1	2.4	1.1	3.7	2.7	2.7	2.7	2.7	1.1	3.7	1.1	2.4
KF77	2.1	4.1	2.1	5.9	4.5	4.5	4.5	4.5	2.1	5.9	2.1	4.1
KF87	3.7	8.2	3.7	11.9	8.4	8.4	8.4	8.4	3.7	11.9	3.7	8.2
KF97	7.0	14.7	7.0	21.5	16.5	16.5	16.5	16.5	7.0	21.5	7.0	14.7
KF107	10.0	21.8	10.0	35.1	25.2	25.2	25.2	25.2	10.0	35.1	10.0	21.8
KF127	21.0	41.5	21.0	55.0	41.0	41.0	41.0	41.0	21.0	55.0	21.0	41.5
KF157	31.0	66	31.0	92.0	62.0	62.0	62.0	62.0	31.0	92.0	31.0	66.0

Size	Fill quantity in liters											
	M4				M5				M6			
	0° A	90° A	180° B	270° A	0° A	90° B	180° A	270° A	0° B	90° A	180° A	270° B
KF67	2.7	2.7	2.7	2.7	2.4	1.1	3.7	1.1	3.7	1.1	2.4	1.1
KF77	4.5	4.5	4.5	4.5	4.1	2.1	5.9	2.1	5.9	2.1	4.1	2.1
KF87	8.4	8.4	8.4	8.4	8.2	3.7	11.9	3.7	11.9	3.7	8.2	3.7
KF97	15.7	15.7	15.7	15.7	14.7	7.0	21.5	7.0	21.5	7.0	14.7	7.0
KF107	25.2	25.2	25.2	25.2	21.8	10.0	35.1	10.0	35.1	10.0	21.8	10.0
KF127	41.0	41.0	41.0	41.0	41.5	21.0	55.0	21.0	55.0	21.0	41.5	21.0
KF157	62.0	62.0	62.0	62.0	66.0	31.0	92.0	31.0	92.0	31.0	66.0	31.0

Key	
M1 / M2 / M3 / M4 / M5 / M6	= Mounting position of planetary gear unit
0° / 90° / 180° / 270°	= Mounting position of primary bevel gear unit
A / B	= Position of the mounting flange at the primary bevel gear unit





## Lubricants

### Sealing greases/rolling bearing greases: Planetary gear unit

#### 8.4 Sealing greases/rolling bearing greases: Planetary gear unit

The table shows the grease types recommended by SEW-EURODRIVE for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $100\text{ }^{\circ}\text{C}$ .

Manufacturer	Grease
ARAL	ARALUB HLP 2
BP	Energrease LS-EPS
Castrol	Spheerol EPL2
Fuchs	Renolit CX TOM 15 OEM
Klüber	Centoplex EP2
Kuwait	Q8 Rembrandt EP2
Mobil	Mobilux EP 2
Shell	Alvania EP2
Texaco	Mulifak EP 2
Total	Multis EP 2
Castrol 	Obeen FS2
Fuchs 	Plantogel 2S





#### INFORMATION

If the lubricant used is not listed in the above table, you have to make sure that it is suitable for the intended application.

#### 8.5 Sealing grease: RF../KF.. primary gear unit and motors

The anti-friction bearings in RF/KF primary gear units and motors are given a factory-fill with the greases listed below. SEW-EURODRIVE recommends regreasing anti-friction bearings with a grease fill at the same time as changing the oil. Observe the separate operating instructions for RF/KF primary gear units and motors.

	Ambient temperature	Manufacturer	Type
Gear unit rolling bearings	$-40\text{ }^{\circ}\text{C}$ ... $+80\text{ }^{\circ}\text{C}$	Fuchs	Renolit CX-TOM 15
	$-30\text{ }^{\circ}\text{C}$ ... $+40\text{ }^{\circ}\text{C}$	Castrol	Obeen F82
	$-20\text{ }^{\circ}\text{C}$ ... $+40\text{ }^{\circ}\text{C}$	Aral	Aralube BAB EP2



#### INFORMATION

The following grease quantities are required:

- For fast-running bearings (gear unit input end): Fill the cavities between the rolling elements one-third full with grease.
- For slow-running bearings (gear unit input side): Fill the cavities between the rolling elements two-thirds full with grease.



## 9 Malfunctions

### 9.1 Notes

Read the following notes before you proceed.



#### **⚠ WARNING**

Risk of crushing if the drive starts up unintentionally.

Severe or fatal injuries.

- De-energize the motor before you start working on the unit.
- Secure the motor against unintended power-up.



#### **⚠ WARNING**

Danger of burns due to hot gear unit and hot gear unit oil.

Serious injury.

- Let the gear unit cool down before you start working on it.
- Only remove the oil level and oil drain plug very carefully.



#### **NOTICE**

Improper handling of the gear unit and the motor may lead to damage.

Possible damage to property.

- Only qualified personnel is permitted to separate drive and motor and to carry out repair work on SEW drives.
- Consult the SEW-EURODRIVE customer service.

### 9.2 Customer service

**Please have the following information available if you require customer service assistance:**

- Complete nameplate data
- Type and extent of the problem
- Time the problem occurred and any accompanying circumstances
- Assumed cause
- A digital photograph if possible



### 9.3 Malfunctions of P.. planetary gear units

Malfunction	Possible cause	Remedy
Unusual, regular running noise	<ul style="list-style-type: none"> <li>Meshing/grinding noise: Bearing damage</li> <li>Knocking noise: Irregularity in the gearing</li> <li>Deformation of the housing upon tightening</li> <li>Noise generation caused by insufficient rigidity of the gear unit foundation</li> </ul>	<ul style="list-style-type: none"> <li>Check oil consistency (see chapter 7.5), replace bearings</li> <li>Contact customer service</li> <li>Check the gear unit mounting for possible deformation and correct if necessary</li> <li>Reinforce the gear unit foundation</li> </ul>
Unusual, irregular running noise	<ul style="list-style-type: none"> <li>Foreign objects in the oil</li> </ul>	<ul style="list-style-type: none"> <li>Check the oil consistency (see section 7.5)</li> <li>Stop the drive, contact customer service</li> </ul>
Unusual noise in the area of the gear unit mounting	<ul style="list-style-type: none"> <li>Gear unit mounting has loosened</li> </ul>	<ul style="list-style-type: none"> <li>Tighten retaining screws and nuts to the specified torque</li> <li>Replace the damaged/defective retaining screws or nuts</li> </ul>
Operating temperature too high	<ul style="list-style-type: none"> <li>Too much oil</li> <li>Oil too old</li> <li>The oil is heavily contaminated</li> <li>Ambient temperature too high</li> </ul>	<ul style="list-style-type: none"> <li>Check oil level, correct if necessary (see chapter 7.4)</li> <li>Check when the oil was last changed; change the oil if necessary (see chapter 7.6)</li> <li>Protect from external heat sources (e.g. provide shade)</li> <li>Change oil (see section 7.6)</li> </ul>
Bearing point temperatures too high	<ul style="list-style-type: none"> <li>Not enough oil</li> <li>Oil too old</li> <li>Bearing damaged</li> </ul>	<ul style="list-style-type: none"> <li>Check oil level, correct if necessary (see chapter 7.4)</li> <li>Check when the oil was last changed; change the oil if necessary (see chapter 7.6)</li> <li>Check bearing and replace if necessary, contact customer service</li> </ul>
Oil leaking <sup>1)</sup>	<ul style="list-style-type: none"> <li>Gasket on the gear unit is not tight</li> <li>Sealing lip of the oil seal turned up</li> <li>Oil seal damaged/worn</li> <li>Too much oil</li> <li>Drive installed in incorrect mounting position</li> <li>Frequent cold starts (oil foams) and/or high oil level</li> </ul>	<ul style="list-style-type: none"> <li>Vent the gear unit, observe the gear unit. If oil still leaks: Contact customer service</li> <li>Check oil seals; replace if necessary</li> <li>Contact customer service</li> <li>Check oil level (see chapter 7.4)</li> <li>Install the breather plug correctly</li> </ul>

1) During the run-in phase (24-hour runtime), it is normal for (small amounts of) oil/grease to leak from the oil seal (see also DIN 3761).





## 9.4 Malfunctions of RF/KF primary gear units

Fault	Possible cause	Remedy
<b>Unusual, regular running noise</b>	Meshing/grinding noise: Bearing damage	Check the oil → replace the bearing
	Knocking noise: Irregularity in the gearing	Contact customer service
<b>Unusual, irregular running noise</b>	Foreign objects in the oil	<ul style="list-style-type: none"> <li>• Checking the oil</li> <li>• Stop the drive, contact customer service</li> </ul>
<b>Oil is leaking <sup>1)</sup></b> <ul style="list-style-type: none"> <li>• At the inspection cover</li> <li>• At the motor flange</li> <li>• At the motor oil seal</li> <li>• At the gear unit flange</li> <li>• At the output end oil seal</li> </ul>	Rubber seal on the inspection cover leaking	Tighten the screws on the gear cover plate and observe the gear unit. If oil still leaks: Contact customer service
	Seal defective	Contact customer service
	Gear unit not ventilated	Vent gear unit
<b>Oil leaking from breather valve</b>	Too much oil	Correct the oil level
	Drive operated in incorrect mounting position	<ul style="list-style-type: none"> <li>• Install the breather valve correctly</li> <li>• Correcting the oil level</li> </ul>
	Frequent cold starts (oil foams) and/or high oil level.	Use an oil expansion tank
<b>Output shaft does not turn although the motor is running or the input shaft is rotated</b>	Connection between shaft and hub in gear unit interrupted	Send in the gear unit/gearmotor for repair.
<b>Operating temperature at backstop too high</b>	<ul style="list-style-type: none"> <li>• Damaged / defective backstop</li> </ul>	<ul style="list-style-type: none"> <li>• Check backstop; replace if necessary</li> <li>• Contact customer service</li> </ul>
<b>No blocking function</b>		

1) Short-term oil / grease leakage at the oil seal is possible in the run-in phase (48 hours running time).

## 9.5 Malfunctions of AM/AL adapters

Fault	Possible cause	Remedy
<b>Unusual, regular running noise</b>	Meshing/grinding noise: Bearing damage	Contact SEW-EURODRIVE customer service
<b>Oil is leaking</b>	Seal defective	Contact SEW-EURODRIVE customer service
<b>Output shaft does not turn although the motor is running or the input shaft is rotated</b>	Connection between shaft and hub in gear unit interrupted	Send in gear unit to SEW-EURODRIVE for repair
<b>Change in running noise and/or vibrations</b>	Annular gear wear, short-term torque transfer through metal contact	Change the annular gear
	Bolts to secure hub axially are loose	Tighten the screws
<b>Premature wear in annular gear</b>	<ul style="list-style-type: none"> <li>• Contact with aggressive fluids / oils; ozone influence; too high ambient temperatures etc, which can cause a change in the physical properties of the annular gear.</li> <li>• Impermissibly high ambient/contact temperature for the annular gear; maximum permitted temperature: -20 °C to +80 °C</li> <li>• Overload</li> </ul>	Contact SEW-EURODRIVE customer service



#### 9.6 Malfunctions of the motor

Malfunction	Possible cause	Remedy
<b>Motor does not start up</b>	Supply cable interrupted	Check connections, correct if necessary
	Brake does not release	→ see the motor operating instructions
	Fuse has blown	Replace fuse
	Motor protection has triggered	Check motor protection for correct setting, correct fault if necessary
	Motor protection does not switch, error in control	Check motor protection control, correct error if necessary
<b>Motor only starts with difficulty or does not start at all</b>	Motor designed for delta connection but used in star connection	Correct connection
	Voltage or frequency deviate considerably from setpoint, at least while being switched on	Provide better power supply system; check cross section of supply cable
<b>Motor does not start in star connection, only in delta connection</b>	Star connection does not provide sufficient torque	Switch on directly if delta inrush current is not too great; else, use a larger motor or a special design (contact SEW-EURODRIVE)
	Contact fault on star/delta switch	Rectify fault
<b>Incorrect direction of rotation</b>	Motor connected incorrectly	Swap over two phases
<b>Motor hums and has high current consumption</b>	Brake does not release	→ see the motor operating instructions
	Winding defective	Send motor to specialist workshop for repair
	Rotor rubbing	
<b>Fuses blow or motor protection trips immediately</b>	Short circuit in line	Repair short circuit
	Short circuit in motor	Send motor to specialist workshop for repair
	Lines connected incorrectly	Correct connection
	Ground fault on motor	Send motor to specialist workshop for repair
<b>Severe speed loss under load</b>	Overload	Measure power, use larger motor or reduce load if necessary
	Voltage drops	Increase cross section of incoming cable
<b>Motor heats up excessively (measure temperature)</b>	Overload	Measure power, use larger motor or reduce load if necessary
	Insufficient cooling	Correct cooling air supply or clear cooling air passages, retrofit forced cooling fan if necessary
	Ambient temperature too high	Comply with permitted temperature range
	Motor in delta connection instead of star connection as provided for	Correct connection
	Loose contact in supply cable (one phase missing)	Rectify loose contact
	Fuse has blown	Look for and rectify cause (see above); replace fuse
	Mains voltage deviates from the rated motor voltage by more than 5 %. A higher voltage has a particularly unfavorable effect in motors with a low-speed winding since in these, the no-load current is already close to the rated current even when the voltage is normal.	Adjust motor to supply voltage.
	Rated operation type (S1 to S10, DIN 57530) exceeded, e.g. through excessive starting frequency	Adjust the rated operating mode of the motor to the required operating conditions; consult a professional to determine the correct drive if necessary
<b>Excessively loud</b>	Ball bearing compressed, dirty or damaged	Re-align motor, inspect ball bearing, re-grease, if necessary, replace
	Vibration of rotating parts	Rectify cause, possible imbalance
	Foreign bodies in cooling air passages	Clean the cooling air passages



### 9.7 Malfunctions of DR/DV brakes

Fault	Possible cause	Remedy
<b>Brake does not release</b>	Incorrect voltage on brake control unit	Apply correct voltage
	Brake control unit failed	Install a new brake control system, check internal resistance and insulation of brake coil, check switchgear
	Max. permitted working air gap exceeded because brake lining worn down.	Measure and set working air gap
	Voltage drop on supply cable > 10%	Correct connection voltage; check cable cross section
	Inadequate cooling, brake overheats	Replace type BG brake rectifier with type BGE
	Brake coil has interturn fault or short circuit to exposed conductive part	Replace complete brake and brake control system (specialist workshop), check switchgear
	Rectifier defective	Replace the rectifier and brake coil
<b>Motor does not brake</b>	Working air gap not correct	Measure and set working air gap
	Brake lining worn down	Replace entire brake disk
	Incorrect braking torque.	Change the braking torque (→ see motor operating instructions) <ul style="list-style-type: none"> <li>• By the type and number of brake springs</li> <li>• Brake BMG 05: by installing the same brake coil body design as in brake BMG 1</li> <li>• Brake BMG 2: by installing the same brake coil body design as in brake BMG 4</li> </ul>
	BM(G) only: Working air gap so large that setting nuts come into contact.	Setting the working air gap
	BR03, BM(G) only: Manual brake release device not set correctly	Set the setting nuts correctly
<b>Brake is applied with time lag</b>	Brake is switched on AC voltage side	Switch on DC and AC voltage sides (e.g. BSR); refer to wiring diagram
<b>Noises in vicinity of brake</b>	Gearing wear caused by jolting startup	Check project planning
		→ see motor operating instructions

### 9.8 Disposal

- Housing parts, gears, shafts and roller bearings of the gear units must be disposed of as steel scrap. This also applies to gray-cast iron parts if there is no separate collection.
- Collect waste oil and dispose of it according to the regulations in force.



## 10 Address List

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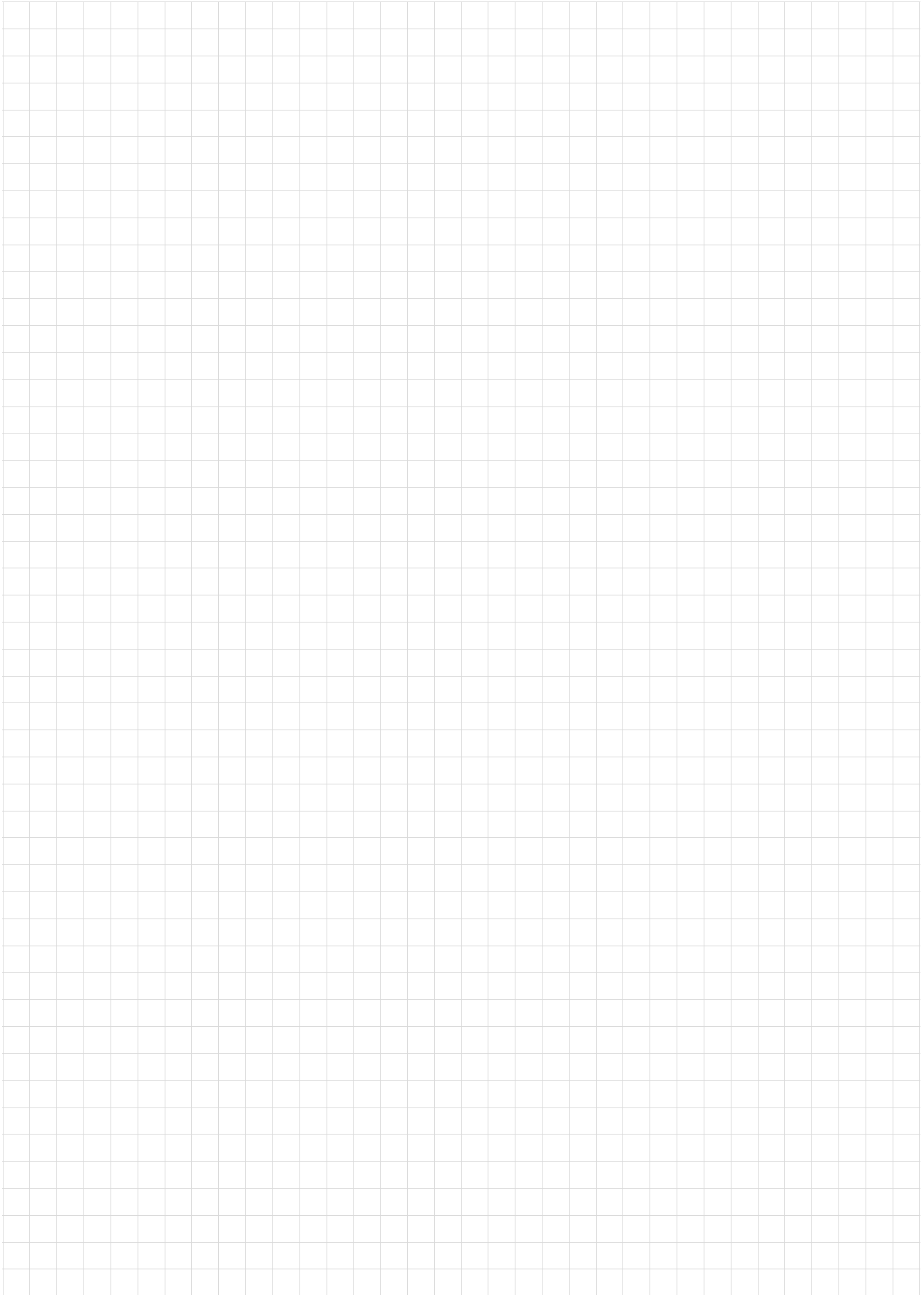
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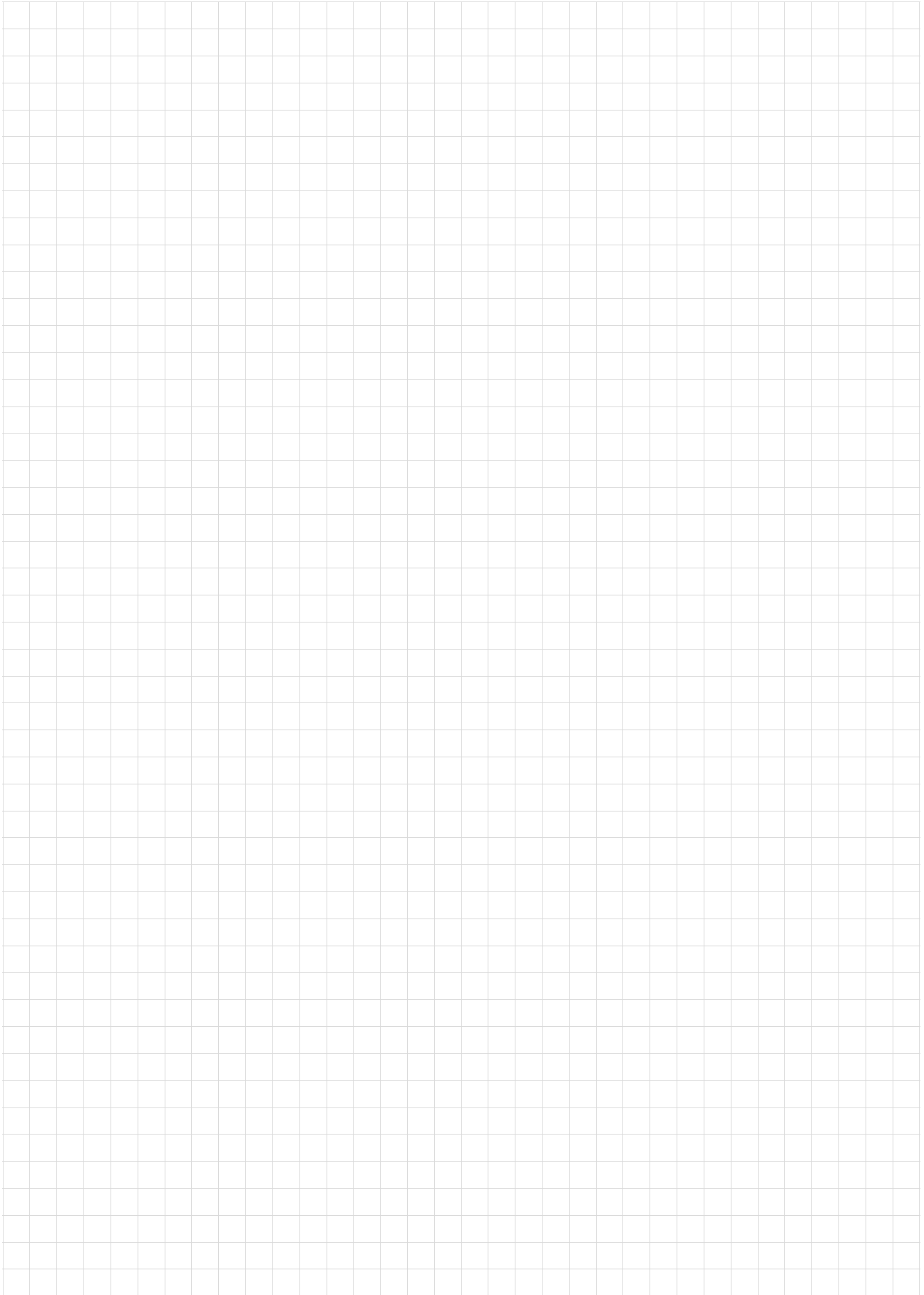


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